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BANDITS, COMMUNISM, DEMOBILIZATION AND LOANS
JAPANESE PLOT AGAINST CHINA!
EXTRATERRITORIALITY! AN EQUITABLE PROPOSITION
DIESEL ELECTRIC LOCOMOTIVES IN ASIA
REPAIR OF LOCOMOTIVES IN JAPANESE GOV'T RAILWAYS
AVIATION AND MARINE ENGINEERING PROGRESS IN THE FAR EAST

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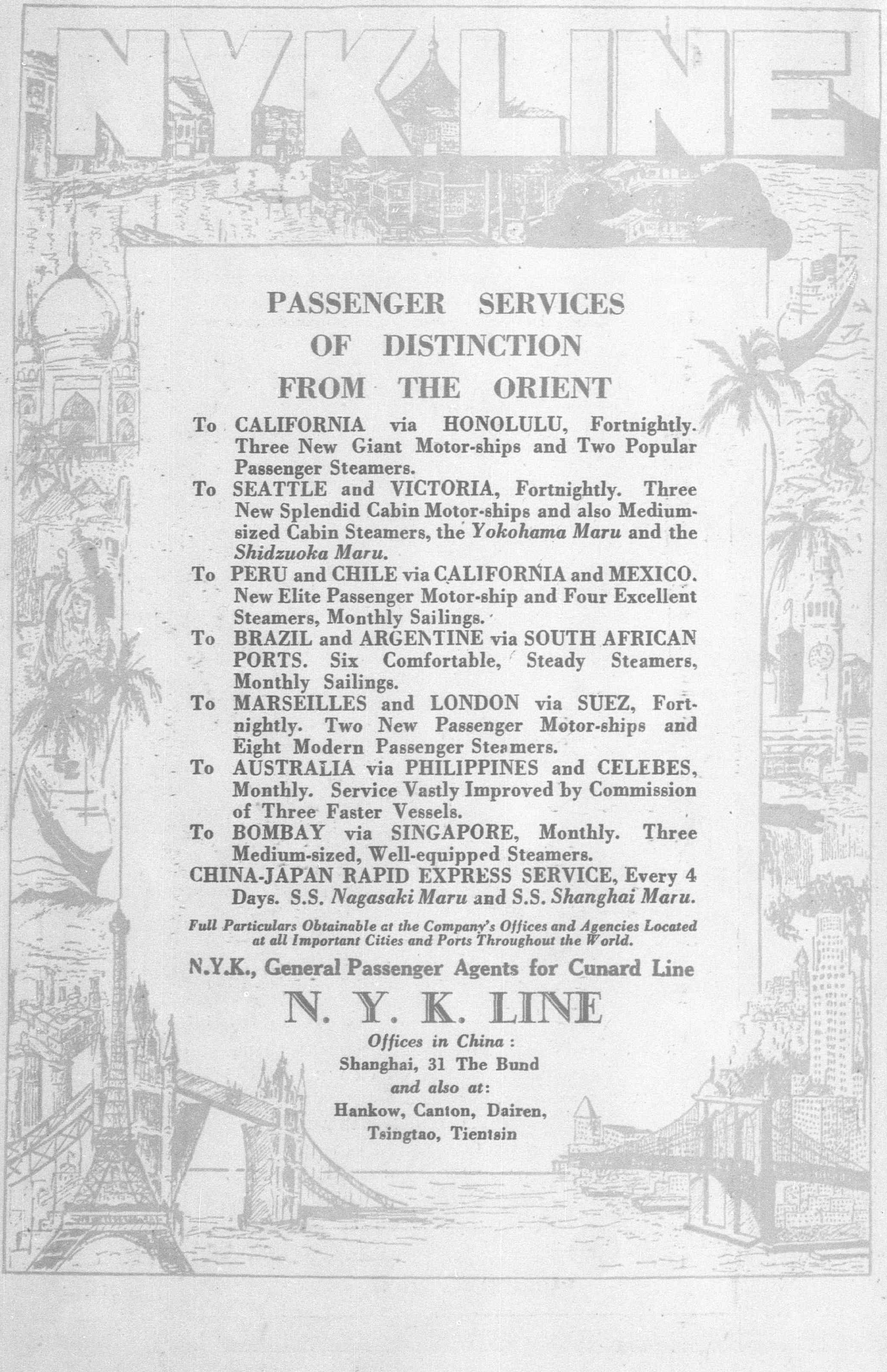

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXVII SHANGHAI, FEBRUARY, 1931 No. 2

Communism, Demobilization and Loans

Can China be Assisted from the Outside Towards Economic Reconstruction with Three Million Men under Arms Costing Two Billion Dollars Annually to Maintain and Another Two Million Bandits, Communists and Pirates Preying on the People?

CAN China be assisted from the outside to get on her financial feet? Is it safe for international bankers to co-operate in the task of rehabilitating China, equipping her industries and building her railways before her outstanding obligations are consolidated in a general refunding loan?

Russia repudiated her debts and confiscated the private property of Americans, yet American capital is equipping Soviet industries on long term credits and helping to make the Five-Year Plan a success. Any argument against lending money or extending credits to China applies with equal, if not greater, force to Russia; yet it is being done, and in a very liberal and large scale way, with the certain knowledge that it will hasten the economic ruin of all the major industrial nations of the world. Why is it, with this menace staring us in the face, that credits after credits are being made available to Russia, while no assistance is extended to China?

If modern industry and finance is willing to wipe the slate clean in order to do business with Russia, why should it refuse to help China along the same lines? International finance has accepted the situation in Russia, looking to future profits to liquidate old indebtedness in whole or in part. In other words, we have taken our losses philosophically and started anew along lines which preserve the fiction of non-diplomatic recognition and embargo on loans by entering into commercial relations and extending long-term credits in order to dispose of our goods and keep our factories going.

The only security for this vast financing is the good faith of a Government which has repudiated its past debts, announced its determination to overthrow the Capitalistic system and bring about a World Revolution. Yet it gets all the credit it asks for from those it has started out to destroy! There must be some good reason why the open and avowed enemy of our social, religious, political and industrial system can procure the sinews of war from its intended victims, while China, whose problem is to find food and work for its starving people, is unable to obtain relief on any terms.

Is it because the Soviet has convinced the outside world that it is there to stay, that it is a real governing force able to maintain and perpetuate itself in power, crush opposition and discharge faithfully its own obligations? For it is now plain to the rest of the world that the 150,000,000 people of Russia have accepted the rule of the dominant party and are working, producing and creating wealth. They may be slaves, half-starved, unhappy and praying for deliverance from their yoke, but for the present they are peacefully facing their destiny. The Soviet has a very firm grip on its internal situation and ruthlessly exterminates all opposition. It is a force to be reckoned with.

When we turn to China, we see a nation of 400,000,000 people who have passed through a prolonged series of devastating civil wars, and although there has at last emerged a dominant group, similar in many ways to its prototype in Moscow, it has not yet consolidated its authority. Up to the present there has been no stability, no security, no guarantees, no peace, and no prospect of peace in China. A frenzy of destruction has seized upon the people, wiping out in a decade the wealth created by centuries of thrift and hard work. For a few months China has been at peace. There is nothing left to fight over. Sheer exhaustion has compelled an armed truce, a unification of all opposing elements under the nominal leadership of Nanking. Can the National Government establish its authority over the country and inspire confidence in its ability to maintain law and order to the point where there is some reasonable hope that it will survive? Until that question is answered in the affirmative it is useless to talk about any large scale foreign financial assistance to rehabilitate the country.

Until the bandits are dispersed, the communist hordes subdued and the vast armies of China reduced to a reasonable size, it seems futile to discuss seriously any scheme for new loans or credits. While three million armed troops remain in more or less active service in rounding up and exterminating an almost equal number of well-armed law-defying forces, what real progress can be made in rehabilitating the country? Extraterritoriality, tariff adjustments, taxation, silver exchange, currency reform, treaty revision, and all the other boons that China is clamoring for, are mere side issues until a groundwork is laid for their success by the establishment of internal peace and security.

The real work of reconstruction in China can be realized only after the subjugation of the communist and bandit hordes and demobilization of the armies. Credits to China for economic development or silver stabilization can bring no permanent relief while the Government is still engaged in a war to establish its authority. There is only one justification at the present moment for a large unsecured international loan to China. It must be either an out-and-out contribution from the national treasuries of the interested Powers, or a transaction backed by these Powers through the World Bank for International Settlements at Basle for the express purpose of financing the Nanking Government to eliminate communism and restore law and order. The cost of the National armies must be borne by the capitalist Powers if China is to be placed in a position to receive further assistance for economic reconstruction.

Hundreds of millions of gold dollars have been advanced to assist Russia's economic development and her warfare against capitalism, money that can be repaid only through the export of Soviet products. In effect, we are financing Russia to deprive us of our own markets. We are now in Russia up to our necks. If we are to get our money back we cannot antagonize or oppose her. Yet we face the problem of assisting Nanking to combat the very system we have financed to success in Russia!

* * *

Demobilization Problems

Two years ago the President of the United States received an American who was interested in obtaining his support to a scheme for the construction of new Chinese railways. After outlining the plan, the President said: "I would like to help China, but let me ask you one question: *What progress is the new Government making in disbanding its armies?*"

After eight years as Secretary of Commerce, President Hoover is better informed as to conditions in China and the basic economic problems of the counrty than any man in the United States. He knew that nothing could be done to assist a nation whose huge armies ate up all its revenues and left nothing to carry on the government with, let alone a surplus to serve as security for new construction loans. Any legislation involving a huge silver loan to China, if it passes Congress, will have to go to the White House, and the President will again place his finger unerringly on the weak spot in the plan and ask: "*What progress is being made in the demobilization of the Chinese armies?*"

It is a fair question; one that must be answered truthfully before foreign governments or responsible bankers will consider any program for China's financial relief. What progress has China made in disbanding its armies since March 1929? At that time there were probably 1,500,000 to 2,000,000 men under arms in the country; *to-day the total is estimated at* 3,000,000!

During the conferences that took place in Nanking between Marshal Chang Hsueh-liang and Marshal Chiang Kai-shek it was revealed that there were 280 divisions, representing over 3,000,000 soldiers, under arms in China. Of this total, 66 divisions and nine brigades were under the National Government, requiring an expenditure of $30,000,000 monthly and a total of $500,000,000 yearly to cover the entire military budget. Other estimates place the number under the direct command of Marshal Chiang Kai-shek at nearly 1,000,000 men. The maintenance of these forces absorbs eighty to eighty-five per cent of the revenues of the National Government, leaving a bare fifteen per cent for civil administration and all other governmental activities. The armies of Kwangtung, Kwangsi, Szechuan, Yunnan, Kweichow, Sinkiang, Kansu and the North-eastern Government (which now embraces practically all the territory north of the Yellow River) do not come into the above picture.

On the basis of Nanking's expenditures for 66 divisions, the total cost of maintaining 280 divisions would approximate $2,000,000,000. But this is only half the story. In a recent report on conditions in Honan Province the provincial authorities estimated that there were 2,600,000 "unemployed" in the province, tabulated as follows: Famine victims, 1,600,000; soldiers, 400,000; bandits, 400,000; unemployed factory workers, 200,000. In other words, in this province alone the number of bandits equals the number of soldiers. Although this proportion may not held good in other sections of the country, yet, when the communist armies south of the Yangtsze are included, the ratio will not be far wrong. A rough estimate of the number of armed men living off people of China, including soldiers, communists, bandits, pirates, smugglers and other lawless elements, will approximate five million men.

The German Industrial Commission that visited China last year estimates the average cost of maintaining a Chinese soldier at 500 marks a year, while the average income of the Chinese peasant is only 150 marks a year. That German report was undoubtedly based on inside information furnished by the German military advisers and instructors to Marshal Chiang Kai-shek's armies, and is probably nearer the truth than any estimate emanating from Chinese sources. This works out to about $125 gold per year, or $375,000,000 gold to maintain the 3,000,000 regular soldiers, without including the heavy costs of campaigning, transportation, ammunitions, etc. If we should add to this another equal amount to maintain the bandits, communists and pirates, it is probably costing China nearly $700,000,000 gold, or say $3,000,000,000 silver, annually to support the 5,000,000 men living off the country. This does not take into consideration the loss of wealth and destruction of property caused by the depredations of these gentry.

This is the real picture of China to-day. The problem is how to disband the soldiers without creating more bandits. The bandits and communists in their great majority are simply "hungry people" driven to desperation and outlawry in order to exist. The armies cannot and will not round them up and exterminate them. If such conditions existed in the United States or any other Western nation the regular forces could not be expected to kill off their own people who have taken to outlawry as the only way to save themselves and their families from starvation. Human nature being the same in China, it is futile to expect the uniformed forces of the government to carry on a war of extermination against their unfortunate brothers in distress. This will probably help to explain why it is customary and more humane to incorporate the bandits into the regular army than to prosecute a vigorous and relentless warfare against them. When it is considered that in many cases the Chinese regulars have not been paid in months, receiving only clothes, food and a place to sleep, there is little difference between their economic status and outlook on life and those they are asked to kill. When the soldier cannot stand it any more he takes his rifle and joins the bandits. When the bandit cannot live off the country he joins the army. Under such conditions no American or European soldier could be expected to join whole-heartedly in a general slaughter of his own people. If it cannot be done in the United States or elsewhere, it cannot be done in China. The armies cannot be disbanded until the bandits and communist menace is destroyed. Any real demobilization should reduce the armed forces of the country to at least a million men. The pay of these men are in most cases in arrears. To set them adrift they must be paid what is due them or given sufficient funds to buy a civilian outfit and feed themselves until they find work. But there is no work or prospect of work, so their discharge simply means augmenting the ranks of the bandits. Granted that work could be found for two million surplus soldiers, how much would be necessary to pay them off?

This is largely a matter for conjecture. No foreign estimate based on the sense of obligation and gratitude to those who have worn the uniform and defended the nation can be applied in China. If left to the Chinese, these men will be given about three dollars silver, expressed in thousands of cash, or just enough to take the demobilized soldier back to the farm to face his problems of life anew. At the same time, something must be done to induce the two million bandits and communists, the "hungry people" to return to the ways of peace. They also require financial assistance.

Now, if these four million men are to exist and earn a living, work must be immediately provided. As they hand over their rifles, they must be given a pick and shovel. The work they undertake must be productive. Railways, highways, irrigation, river conservancy, dykes and public works must be started on a large scale to absorb four million unemployed. If these men are paid only a minimum wage of twenty silver dollars a month, just enough to maintain themselves, it will call for a billion dollars annually for the pay-roll of these enterprises. What with bankers' commission, overhead, purchase of materials from abroad, interest and other charges, it will require a loan of approximately $1,700,000,000 for the first year.

But what about the poor starving wrecks of humanity, the hard-working, sturdy peasant of the countryside, reduced to famine conditions by the exactions and depredations of those we are going to relieve? We have let these poor unfortunates starve by the millions in North China—in Shensi, Shansi and Honan—because there was no way to get relief in to them or any guarantee that our relief supplies would not be seized by the military and the bandits. The fundamental laws of humanity which operate in all other parts of the world to succor the destitute had to be set aside in China, because of the rapacity of those who carried the gun. Where lies our first duty—to the victims of militarism or to the militarists?

While reliable statistics are not obtainable, it has been estimated by Chinese investigators that the number of unemployed in China now totals over 150,000,000, one-third of the population, of which 20 to 25 million are famine sufferers. What good will it do to provide work for soldiers, bandits and communists, when there are 150,000,000 more "hungry people" in the background ready to step into their places and take up the rifles they have laid down? As long as four to five million rifles and stores of ammunition remain scattered throughout the country, what guarantee can there be that they will not find their way back into the hands of desperate men seeking an existence by the only way left to them?

Would the Chinese Government consent to a provision in any loan agreement stipulating that all rifles and war material over a certain amount be surrendered or even stored in a central arsenal under foreign observation? Would the provincial military chiefs permit their demobilized rifles to leave the province as a condition for disbandment and rehabilitation loan? We doubt it. If it cannot be done, what hope is there of restoring peace and prosperity to the millions of China?

American silver politicians, Canadians desirous of finding a market for their surplus wheat, Germans seeking outlets for their manufactured goods, British manufacturers appalled at the loss of their once vast textile trade, together with philanthropists, notoriety seekers, financial experts, and middlemen of all sorts are putting forward proposals to help China, believing that with one stabilization loan the miracle of world unemployment will be solved. Some of these proposals are worthy of study, but none of them go to the root of the problem. Under the conditions prevailing in China we could pour all the capital of the world into the country and it would vanish in the same manner that the billions that have been squeezed out of the people in the past two decades have also disappeared. Where the billions have gone to is the mystery of China, and until there is a responsible government in the country giving an account of its stewardship to the people, it will remain a mystery. The more millions that are poured into China without suitable and enforceable guarantees is just so much wealth taken from the lending nations to perpetuate a system that will in time bankrupt the entire world and drag down the living standards of the West to the level of Asia.

Senator Pittman's proposal to lend China the equivalent of a billion gold dollars in silver bullion in order to restore the value of the while metal and rehabilitate the country might help if all the interested nations could be induced to join in the loan and if the Chinese would agree to foreign supervision of the expenditures and administration over the revenues created from the use of the funds.

However, all discussion of such a loan is a waste of time. The proposals now being formulated by silver statesmen on Capitol Hill are evidently intended for the delectation of their constitutents. The State Department has denied any official knowledge of the much-discussed silver loan. If and when it ever emerges from the committee stage, and is reported out on the floor of the Senate and passes that body and the House of Representatives, it will still have to go to the other end of Pennsylvania Avenue for final approval. Unless we are very much mistaken, the keen analytical mind of the Man in the White House, with a very accurate knowledge of the economic problems of China, will want to know "*What progress has been made by the Chinese in disbanding their armies?*" This is the real crux of the problem. Three million under arms and another two million bandits preying upon the people will eat the heart out of any country and drag the rest of the world down to ruin with them.

* * *

In twenty years China has been transformed from a mediæval agricultural nation into a grouping of militaristic states which have carried on an almost incessant warfare for supremacy. We know what the Woeld War cost the nations of the West in lives, property and treasure, and what future generations will have to pay to liquidate the debt. China is no exception to the rule; we can only estimate roughly the stupendous loss in lives and properties A French missionary bishop, speaking in Paris recently, made the statement that Communists alone were responsible for the deaths of twenty million people! We do know that the country lies prostrate, its purchasing power gone, its industries ruined, its people without work, the interior overrun with soldiery, bandits communists.

A vast military establishment has been created until China maintains to-day the largest national army in the world, in the main well equipped and familiar with the most modern implements of destruction. The Chinese army of 1930 is not the same undisciplined host that marched north from Canton under the direction of Borodin and Galen in 1927. It has had three years of intensive training under expert German military instructors in a school of actual warfare.

When Dr. C. T. Wang, China's Minister of Foreign Affairs, tells an audience of newspaper correspondents that he hopes China will not have to employ means other than peaceful negotiations to obtain the Powers' consent to abolition of extraterritoriality, the world is permitted to glimpse something of the effect the possession of these huge armies is already exerting on her international relations.

It matters nothing from the Chinese viewpoint that the army of Chiang Kai-shek is outnumbered two to one by the forces of other more or less independent states who profess allegiance to Nanking. These armies may fight each other over a division of territory or the spoils of power, but will unite and fight together when it comes to an issue with the "foreigner."

Can China disband these armies? Who will set the example? Will the Manchurian War Lords weaken themselves to the point where Nanking can extend its full authority into these provinces? Will Nanking agree to any reduction of the Manchurian armies with a major issue pending with Russia? Can Nanking demobilize while the interior is overrun with bandits and communists, numerically superior to its own forces?

It is safe to predict that there will be no real demobilization. The armies will remain at more or less their present strength, perhaps grow even larger, as the bandits and communists are incorporated into the regular forces. The drain on the treasury will continue.

This picture is not overdrawn. It is true that the last major struggle was finished in October, that the country is negatively united under Nanking; it is true that some progress is being made in rounding up the communists and bandits; it is true also that all the cities of central China are at present fortified camps, surrounded with barbed wire entanglements and defences, with watchful soldiers ready to shoot at sight any poor peasant who looks like a communist. It may be that progress in wiping out the scourge is being made, but the picture does not change, nor can it change with a background of 150,000,000 "hungry people" clamoring for the right to exist.

This article is not intended as an argument against any outside financial assistance to Nanking, but an honest effort to clarify the facts. Nanking must be assisted as soon as practically possible, for the simple reason that, no matter how much we may disagree with its policies, it stands as the only bulwark against the communization of China and complete anarchy. China needs outside

(Continued on page 106)

As this issue of *THE FAR EASTERN REVIEW* goes to press, Mr. Ling Kong-kou, chairman of the Chinese Bankers' Association of Shanghai, in a statement published in the *Shanghai Evening Post*, says: "Chinese banks have sufficient funds to finance and support initial government reconstruction work throughout the country and are willing to carry out the reconstruction program when a state of normalcy has been reached, bandits suppressed and warfare halted.

Mr. Ling declared that Chinese banks have in the past refrained from investing large sums of money in government reconstruction work because of civil wars, activities of bandits and the unsettled political situation in general which has prevailed here for the past 19 years.

He voiced the belief that when the situation in China is normal, warfare halted and bandits suppressed, Chinese banks will be more than willing to place their resources at the disposal of the government for reconstruction work.

The program of the government, so far as reconstruction is concerned, he declared, could be successfully carried out with the help of Chinese banks, and without foreign loans. Chinese banks, he asserted, have the funds with which to do this once they are given assurance of normal conditions and evidence that their resources placed at the disposal of the government will be protected.

This clear cut, emphatic statement from the official spokesman of the Chinese Bankers' Association is such a frank recognition of the basic situation in China, that no further comment is necessary. Dr. Ida Kahn's moving appeal to the world to help China suppress Communism, which appears in *The China Weekly Review* of February 28, is a candid confession of the inability of the armed forces to restore law and order in the interior, fully substantiating our own presentation of the facts.

A "Japanese Plot" Against China

"THE TRAP THEY HAVE SET FOR THE YOUNG MARSHAL"

"Seldom do diplomatic events in the Far East "just happen." Usually they take place in accordance with well thought out and carefully pre-arranged plans. This applies in particular to developments in Sino-Japanese relations, a matter touched upon in these columns of "The Review" last week. It is therefore with considerable interest that one observes current developments in respect to the Manchuria situation: First, there were reports spread by the semi-official Japanese news service in North China to the effect that political conditions were becoming disturbed at Mukden and that it might be impossible for Marshal Chang Hsueh-liang to return; or, in the event of his return, that he might have difficulty in maintaining his position in the future. Then gradually it became known that Japan was planning to press for a settlement of certain outstanding questions pertaining to railway competition in South Manchuria. But about this time, Henry W. Kinney, well known American propagandist connected with the Japanese owned and controlled South Manchuria Railway, arrived in Shanghai and proceeded to inform the American and British correspondents and local newspapermen "that there was nothing to this talk about railway competition in Manchuria; that the Japanese were not worried about the situation; that Manchuria was big enough for everybody, etc., etc., etc." Now, as the final move in the plot we read in certain Japanese propaganda organs about the sudden menace of Soviet Russia and about how necessary it is for China to accept Japan's assistance, otherwise China will be completely overwhelmed by the Red menace from the North."—From "The China Weekly Review," February 7, 1931.

In the January issue of this magazine we invited attention to the realities of what in our opinion is the paramount issue of Eastern Asia; the conflict between the Slav and the Mongol for the possession of the waste areas that now separate the two races. Powerful economic forces are rapidly alienating the border provinces of China from their traditional allegiance and bringing them imperceptibly within the Soviet sphere of influence; a natural law that over-rides political divisions. Within three years, the Soviet plan of economic rehabilitation will completely change the strategic situation in Asia. When the Trans-Siberian trunk line is double-tracked as far as Irkutsk, when the Kutnetz and Magnetogorsk mills are pouring out their three and a half million tons of steel; when the cotton crop of the newly irrigated districts of Turkestan, the output of the textile mills and new industrial plants, non-ferrous mines and the flood of agricultural products from the State farms seek their natural outlet over the main artery of traffic to the markets of China or for shipment abroad, there is only one deep-water terminus available to handle this enormous traffic. The success of the Soviet program depends upon its control over the vital transportation link between Irkutsk and Vladivostok. It is inconceivable that any government, let alone the Soviet, after expending billions of dollars to develop the richest agricultural and mineral lands of Asia, should hand over the key to its prosperity to any other nation, once that key is in their possession.

M. Karakhan, Soviet Assistant Commissar of Foreign Affairs and Mr. Moh Te-hui. the Chinese Plenipotentiary to settle the difficulties between the U.S.S.R. and the Nationalist Government over the status of the Chinese Eastern Railway. Before the departure of Mr. Moh Te-hui from Moscow Mr. Karakhan asked him to convey to the Nanking Government that, in case China would not observe the Habarovsk Protocol, Russia might send her own troops for the purpose of protecting the Chinese Eastern Railway by force. It is understood that since then, Russia is moving troops toward the Russo-Chinese frontiers, while the Governor of Heilungchang has telegraphed to Mukden and Nanking for reinforcements.

Soviet control over the Chinese Eastern Railway as the vital link in its domestic transportation system, will become as important to the welfare of the nation as control of the Panama Canal is to the prosperity and security of the United States or the Suez Canal to Great Britain. Siberia has but one deep water outlet, frozen over for six months of the year. Up to the present time, a limited amount of ocean tonnage entering and clearing through the port of Vladivostok has been made possible through the liberal use of ice-breakers. The enormous expansion of traffic seeking an outlet from a rejuvenated hinterland will necessitate enlarged terminals, warehouses, wharf facilities, port improvements and additional ice-breakers. The Soviet Government has appropriated in its current budget, Roubles 17,000,000, to carry out these improvements.

Of course, Moscow can abandon the C.E.R. and utilize the Amur Railway as an outlet for its Siberian traffic, but this extra haul, over a very difficult and hastily constructed line, will make the difference between profit and loss in her export trade. It is possible that the kind-hearted, simple-minded, pacifically-intentioned Gentleman from Georgia who now directs Soviet policy, will scrupulously refrain from hurting China's feelings and will utilize the Amur detour as the outlet for the Soviet's Siberian trade. It is comforting to delude ourselves into believing that after expending billions of roubles to develop Siberia, Moscow will hand over the traffic key to its prosperity to China. Soviet policy in these matters has always been very generous. Although we have faith in Moscow's good intentions] and friendly sentiments towards China, we do not believe that the Soviet program of economic expansion and penetration of weaker states, differs one iota in its fundamentals from the methods which have built up other empires to their present proportions.

We cannot apply one principle in one part of the world and another in another part. Principles which hold good in Europe and America have just as much force and reason when appealed to by Asiatic Powers. If is is just and right for the United States to hold the Panama Canal and the future water route across Nicaragua for vital strategic and economic reasons; if Great Britain is justified in preserving her control over Gibraltar, Malta, Cyprus, the Suez Canal and Aden to defend the All-Red Route to India, the Far East and Australia; if Japan insists that control of the South Manchuria Railway and the Leased Territory of Kwantung is essential to her strategic defense and economic life; it will not be difficult for Moscow to advance a similar argument in defense of a vital economic necessity. If it was necessary to create a special zone to provide an outlet to the sea for Poland, Moscow can advance the argument that her future welfare, prosperity and security can be assured only by creating a Soviet corridor through Northern Manchuria, giving her free access to deep water on the Pacific. If Soviet Russia was a member of the League of Nations and put forward such a claim, it would probably be welcomed as a definite solution to a dangerous problem, but as Russia does not belong to the League, she must seek her own solution with China.

It must not be overlooked that the methods employed by the United States in acquiring the Panama Canal Zone, were faithfully followed by Russia in amputating Mongolia from the main body of China. And as Mongolia set itself up as an independent state under the protection of Russia, so can Sinkiang and the Barga Region proclaim their independence and get away with it with Moscow's recognition. We would not be surprised to learn at any time that the Barga Mongols have declared their independence and asked to be incorporated in the Soviet Union.

If full control over the C.E.R. becomes vitally essential to the economic welfare of a nation of 150,000,000 people and Moscow proclaims that its national prosperity and existence is imperilled by China's obstructionist tactics in the management of this natural outlet to the sea, there is only one outcome to a controversy that will not be taken for adjudication to the League of Nations or the World Court or be set aside by the Kellogg Pact.

No outside Power will intervene in this dispute. No outside Power can bring pressure to bear upon Russia. No single Power or combination of Powers can challenge Russia's dominant strategic position in Central Asia. When Moscow decides that the time has arrived to demand from China that her outlet to the Pacific be guaranteed under some form of agreement that assures to her full control over this artery of traffic, China will have to comply or invite the loss of her outlying provinces. A disunited, bankrupt and weakened China cannot hope to withstand any demands that Russia may make. China's hope lies in immediate unification and the construction of essential strategic railways in Manchuria and Mongolia that will enable her to consolidate her rule over these border provinces.

Can China do this single-handed? Can China raise the millions necessary to build these railways while there is yet time to strengthen and uphold her authority over these regions? Who will lend China two hundred millions, fifty millions, even a million dollars, with which to build railways in regions that may again become the cock-pit for the mastery of Asia? Echo answers, Who?

If China through her own credit, cannot protect herself; who then will come to her assistance? There is only one nation whose interests are identical with those of China in these regions. What will become of Japan's interests in Manchuria, when the Soviet Five Year Program is completed; when for the first time in her history, Russia is in an invulnerable strategic position in Central Asia, with Irkutsk as her base of operations and industrial activity, and her economic existence depends upon free and unrestricted control over the Chinese Eastern Railway? With Outer Mongolia incorporated in the Soviet system, the pressure of Russia in these regions constitutes a formidable menace to Japan's position in South Manchuria, where her hands are now tied by the refusal of the Chinese to co-operate in defending their mutual interests.

What is China to do? Will she submit to the Soviet, and place in jeopardy Japan's rights, or will she co-operate with Japan and rely on her superior military and financial strength to once more save her territory from passing under the rule of Russia?

Now it may be true that the military party in Japan, as distinct from the Liberal element which controls the government, has never given up its ambitions of territorial and political aggrandizement. The military and naval element in countries like the United States, Great Britain and France, invariably have the last word in dictating the military needs of the nation, and Japan is no exception to the general rule. There are certain contingencies in Far Eastern affairs that must be governed by the final decision of the General Staff of the Japanese army and navy. It is quite certain that Japan will never budge one inch from her so-called special position in Manchuria, at least, until the Chinese are willing to admit the reasons which brought Japan into Manchuria and indemnify her for her sacrifices in restoring their sovereignty over these regions. It may also be accepted that Japan will fight before she surrenders the rights she gained as the result of two previous wars; the last forced upon her by China's secret diplomacy. Every Japanese statesman and publicist who has endeavored to explain their national problems are unanimous on this point. These facts require no elaboration. Their recognition does not imply propaganda of any nature. Mr. Y. Matsuoka made them very clear at Kyoto.

A situation is rapidly being brought to a head in the North in which the vital interests of three nations will clash and precipitate a show-down. The whole future of Siberia and the Soviet Far East hinges on who is to control the Chinese Eastern Railway, the only outlet to a deep water port for this vast empire. It is infantile to believe that Russia will permit its future welfare to be placed in jeopardy by handing over this main artery of traffic to a government whose instability is a constant menace to its economic life. Neither Nanking or Mukden, singly or united, can stave off the relentless Soviet pressure and the inevitable demand for a free hand to control the only natural outlet for its activities.

The Japanese may have no just cause for alarm, but China remains China, showing no indication of changing her traditional tactics. It is, possible, as Mr. Matsuoka pointed out at Kyoto, that another Li Hung-chang or Sun Yat-sen may arise and seek an alliance with Russia. If this should happen, Japan would be called upon to again stake her existence on the plains of Manchuria. Responsible official spokesmen have declared that Japan will never surrender her hard won position in Manchuria, until such time as China can discharge faithfully her international obligations, defend her neutrality and guarantee security to Japan against the menace that looms from the direction of Urga.

This may be very disagreeable and annoying to the *amour propre* of the Chinese, as it would be to any other nation placed in the same situation, but it does no good to blink or conceal the fact. Japan has no desire to humiliate the Chinese or add to their difficulties, but she holds her own interests paramount. If China could enforce her neutrality and guarantee that her territory would never again be employed as the bridge for an attack upon Japan, there would be no sense or reason for Japan to proclaim any special interest, other than economic in these regions. But the experience of two years ago and the inevitable trend of present events is far from reassuring. Japan's determination to defend her rights in Manchuria, constitutes the only guarantee that China's sovereignty in these regions will be upheld.

It is not always possible to separate the truth from the welter of propaganda that comes out of Manchuria, but it is becoming increasingly apparent that the Soviet policy in that region is rapidly hardening. Nanking is fully aware of what is impending and insists that the question of control over the C.E.R. must be settled with Moscow before other issues are discussed. The Russians stand on the Habarovsk Protocol and have been gradually eliminating Chinese control over the C.E.R. and regaining many of their surrendered rights in Harbin and along the railway zone. Only by purchasing outright the Soviet interest in the line can China re-establish her full authority in these regions. This plan is not only impracticable from the financial viewpoint, but difficult to realize now that the whole economic future of Siberia rests upon continued Soviet control of this outlet to the sea. It is significant that the Soviet Government has announced its intention to build a branch railway from Nikolsk to Possiet Bay

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An Equitable Proposition

At a dinner given on February 12, at the Majestic Hotel, Shanghai, to the local and foreign press representatives, Dr. C. T. Wang, Minister for Foreign Affairs, delivered a speech in which he emphasized the determination of the Chinese nation to obtain the abolition of extraterritoriality without further delay. "The Chinese Government and people," he said, "are fully resolved to exert their maximum efforts to attain this end. Any further delay will only intensify their determination to see it consummated. *I sincerely trust that China will not be forced to adopt any measure to obtain her objective, other than that of friendly negotiations!*"

The main phases of the extraterritorial problem have been so often elucidated and commented upon in the editorial pages of this magazine that their repetition at this time is stale and unprofitable.

If the Powers concerned should unduly prolong friendly negotiations or decline to acquiesce in China's full demands—a not unreasonable supposition—what measures will China adopt to enforce her viewpoint?

Has the picture changed in the last few months? Nanking has fought a war and defeated its most formidable opponent of the year, but has it won the country? Has it consolidated its authority? Does it dare disband its armies? Can it guarantee security and justice anywhere? Will the wealthy Chinese living in the security of the International Settlement of Shanghai move back to their native cities, towns or ancestral homes? Will they even reside in the suburban districts of Shanghai and place their persons and properties under Chinese law and police protection? Foreigners occupy all the houses on the Tunsin, Great Western and Columbia Roads. They are building up Columbia Circle into a choice residential district. Why? Simply because nearly every comfortable house in the Settlement is now occupied by wealthy Chinese seeking protection from the anarchy raging outside. Every available piece of real estate has been purchased by Chinese seeking a safe investment for their money. Gradually the foreigner is being elbowed out of the Settlement into Chinese territory to live under Chinese law and police protection, while the Chinese are flocking into the Settlement and demanding control over its administration by reason of their numbers and tax contributions.

Many foreigners would have no objection to living under Chinese law and taking their chances with the Chinese if there was the slightest indication that the latter reposed confidence in their own authorities. When the wealthy Chinese ex-official is willing to retire to his ancestral home, as he did in the past; when he is even willing to reside in a house on the outlying roads of the Settlement, it would be time to consider abolishing extraterritoriality.

Many officials of the National Government maintain homes in the International Settlement or French Concession of Shanghai. If they want to create a feeling of confidence in their own government, they should be the first to set an example. There are several foreign realty companies in Shanghai which might be willing to erect a few hundred commodious homes along the extra-Settlement roads and let them on long-term leases to Chinese officials, if the latter are reluctant to invest their own funds in extra-Settlement property.

We live outside the Settlement limits. Every day as we drive into town we see at the corner of Great Western and Edinburgh Roads, a group of municipal police wearing bullet-proof vests and armed with big automatics stuck loosely in a breast strap, who stop every suspicious automobile that leaves the Settlement for Chinese territory. In fact, all the roads are similarly guarded in order to apprehend the kidnappers who seize their victims in the Settlement, force them into a waiting automobile and whisk them over into Chinese territory to be held for ransom or a worse fate. No Chinese official or business man suspected of having a fortune is immune from the attentions of these gentry. Difficult as it is to put an end to kidnapping in Shanghai, wealthy Chinese from all over the country sneak into the Settlement to hide from persecution. Their sole protection is what is afforded by the foreign Municipal Police. Take that protection away, abolish extraterritoriality and hand the Concessions over to Chinese authority, and there would ensue an orgy of lawlessness that would drive every Chinese of means to Dairen or Hongkong, their last refuge in their own land.

Dr. Wang declares that the Chinese Government and people are fully resolved to exert their *maximum efforts* to attain the abolition of extraterritoriality. It would help along their program if the Chinese people would exert only a *minimum effort* by vacating some of the choice residences in the International Settlement and French Concession and show their determination to support him by moving into a house located on some extra-Settlement road. Before resorting to threats, why not shame the foreigner into accepting the Chinese demands? Make the foreigner lose face with his own Government by proving conclusively that it is safe to live outside the Settlement limits. If that point could be established it would soon create a reaction in favor of the abolition of extraterritoriality. There would be a rush on the part of foreigners to acquire a few acres of land, ten, fifteen or even twenty-five miles out in the country on which to build their homes. Nobody wants to live in Shanghai itself. Once the Chinese convince the foreigners by their own example that it is safe to reside in the neighboring country, the value of real estate for miles around would double and treble in no time.

The crowding of the Chinese into the International Settlement and French Concession of Shanghai, acquiring all the comfortable residences and choice pieces of real estate, is compelling the foreigner to become a flat-dweller in a land whose charm has been the ability of the average salaried employee to live in a fairly comfortable house. At the present moment there are in course of construction and projected over 2,000 apartments

Dr. C. T. Wang, Minister of Foreign Affairs in Shanghai for foreign occupancy, the result of the Chinese pressure on the foreign residential quarters.

If Dr. Wang would induce his colleagues to move from the "wicked, lawless and badly administered foreign settlements" out into the clean, wholesome, peaceful, healthy and beautiful country-side, it would start a movement that would soon bring the foreigner to his point of view.—G.B.R.

Dr. Wang's Speech

The full text of Dr. Wang's speech follows:—Gentlemen,—On December 28, 1929, the National Government of the Republic of China issued a mandate declaring that the actual process of re-establishing Chinese sovereignty by the abolition of extraterritoriality began on January 1, 1930. As I had occasion to elaborate in a statement issued two days later, the issuance of such mandate was merely a step towards removing the cause of constant conflict and, at the same time, promoting the relations between Chinese and foreigners. The Chinese Government, relying on the sympathy already shown and assurances given by the Powers concerned, believes that there is no difference of opinion between China and these Powers regarding the principle involved, and it has always held itself ready to consider and discuss, within a reasonable time, any representation made with reference to the plan to be adopted for the application of this principle. Since then over 13 months have elapsed, and it is a matter for sincere regret that the desired solution remains yet to be consummated.

Extraterritoriality in China is a legacy of the old régime, which has not only ceased to be adaptable to present-day conditions but also hindered the free development of China's judicial and administrative machinery. The inherent defects and incompatibilities of the system of consular jurisdiction have been clearly pointed out by the Chinese Government on various occasions and as freely admitted by Western jurists and publicists in their official utterances as well as academic discussions.

Nearly 30 years ago a number of Powers agreed to relinquish their extraterritorial privileges in China when they were satisfied that "the state of Chinese laws, the arrangement for thier administration, and other considerations warranted" them in so doing. It cannot be denied that China has made most encouraging progress in the path of legal reform and that every effort has been exerted by the National Government to ensure real success in this direction. The most important codes, and laws, including the civil code, the criminal code, laws governing civil and criminal procedure, land laws, commercial laws, etc., of a most progressive nature, have, therefore, been promulgated, while courts and prisons along modern lines have been established throughout the Republic. And, in keeping with the size of the country, additional courts and prisons are being organized and erected wherever required.

Human nature being what it is, it can only be a matter of individual opinion as to whether "the state of Chinese laws" and "the arrangements for their administration" have, or have not, attained the standard to which China is expected to conform, and opinions in such cases seem to be dictated by considerations of self-interest. It is manifestly unfair to permit one and the same party to be the complainant and the judge at the same time. The method employed in the report submitted, in 1926, by the International Commission created by the Washington Conference to investigate into the workings of extraterritoriality in China, is, consequently, not unlike that of a man who first presents his case and then proceds to pass judgment thereon.

The important fact seems to be overlooked that the abolition of extraterritoriality is to-day neither so radical nor so revolutionary an innovation as it may at first appear to be. Of the 25 nations now possessing treaty relations with this country, 10 are without extraterritorial rights, six have agreed to relinquish them under certain conditions, the treaties of three have expired, and there are only six whose treaties have but a few years to run. In other words, the nationals of almost one-half of the treaty Powers are already amenable to the jurisdiction of the Chinese courts, while another one-fourth have pledged their readiness to submit their nationals to the same jurisdiction. The doing away of the anachronism of consular jurisdiction is a departure to the nationals of merely the six remaining Powers.

Furthermore, it should be remembered that China is to-day the only country which is still bound by the system of extraterritoriality. Since all other nations once similarly situated have re-established their jurisdictional sovereignty, the Chinese Government and people would not be true to themselves if they did not endeavor their utmost to see extraterritoriality abolished within the earliest possible date.

The above-quoted treaty provision that the Powers concerned were prepared to relinquish their extraterritorial privileges when they were satisfied that "the state of Chinese laws, the arrangement for their administration, and other considerations warranted" them in so doing, appears to have been construed by the interested Powers in a way calculated to ensure the prolongation instead of the cessation of the extraterritorial régime.

It is earnestly hoped that the present negotiations will, within the immediate future, eventuate in the fixing of a definite date for the formal termination of extraterritoriality in this country. The Chinese Government and people are fully resolved to exert their maximum efforts to attain this end. This implies no threat to anyone, and any further delay will only intensify their determination to see it consummated. I sincerely trust that China will not be forced to adopt any measure to obtain her objective other than that of friendly negotiations.

A "Japanese Plot" Against China

(Continued from page 73).

in order to develop the Ussuri Line. At the same time it provides one more deep water outlet facing the Japanese ports in Northern Korea.

All this of course is a "Japanese plot" against China. However, we feel that the best interests of China will be advanced by stating and drawing rational conclusions from the facts, as we see them.

China is the arbiter of her own fate. She can align herself with the Soviet or she can play the game with Japan. It makes little difference which program she adopts. In either case, she can play only a very subordinate part in the larger drama upon which the curtain is rising.

When the economic life of Soviet Asia is dependent upon free access to the sea across the Northern Manchurian cut off, and Moscow declares that control over the C.E.R. is vitally essential for the maintenance of her national existence, she will simply be appealing to an argument that all other governments have employed to justify their aggression upon weaker states.

Now, it is possible that Moscow will do nothing of the kind. It is quite conceivable that the peace-loving group directing the policies of Moscow will develop Siberia, double track the Trans-Siberian line and entrust the future prosperity of their country to a line wholly or partially controlled by China. It may be just as well for the Chinese to delude themselves into the belief that this will take place, and when they are rudely awakened from their pipe dreams, *The China Weekly Review*, will discover that it is only another Japanese plot, to annex China.—G.B.R.

Largest Soviet Power Station in Siberia

Early in November the foundation was laid for the first regional power and heating station in Kemerovo, Siberia, which will be the largest of its kind in the U.S.S.R., with a capacity of 560,000 kilowatts. The electric transmission lines will extend 87 kilometers to the north and 148 kilometers to the south.

Kuznetz Steel Mill to Be Increased 31 Per Cent

The capacity of the Kuznetz steel plant, which is being built under the supervision of the Freyn Engineering Company of Chicago, will be increased 31 per cent in accordanee with a new plan. The annual output of pig iron will be increased to 1,200,000 tons instead of the 860,000 tons, originally planned, of steel ingots to 1,450,000 tons, as against 1,020,000, and of finished metal to 1,130,000 tons, instead of 860,000. This increase in capacity will necessitate an additional expenditure for construction of about 25 million roubles, or 10 per cent of the original cost. However, the cost of production will be cut in the case of pig iron by 27 roubles per ton (299 roubles per ton as compared with 326 roubles according to the original plan) and of rolled steel by 63 roubles per ton (317 roubles per ton as against 380 roubles, according to the original plan).

The management of the Eastern Steel Trust and consulting engineers from the Freyn Engineering Company have examined this new plan and propose that the management of Kuznetzstroy still further increase the capacity of this plant, to bring the annual output of pig iron to 1,700,000 tons and of rolled steel to 1,400,000 tons.

Engineering Advertising in the Far East

The British Economic Mission's visit to Japan discovered at least one important reason why British engineering orders have fallen off in that country. British merchants in Japan said that they were badly treated in the matter of advertising support, being compelled not only to prepare their copy but pay all the publicity expenses attached to creating a market for the manufacturers' goods. *They point out that the only foreign interests which operate at a worth while profit in Japan are those whose advertising campaigns are financed by the home end of the business.*

Commenting on this, the *British Export Gazette*, defending the manufacturer adds :—

"Certainly the manufacturer should meet these charges, but it is not in human nature for a man whose knowledge of the market sometimes extends little further than its geographical position to devote a substantial sum annually to such an end. Can importers honestly say that if they took the trouble frankly to discuss the matter with the manufacturer, reviewing it from both points of view, they would not gain his sympathy and support ? Proof that they would is provided by those who have done so."

The trouble of the British merchant in Japan in regard to advertising is duplicated in China and other parts of the Far East. It is not alone the British who are losing business, but Americans, Japanese and Germans as well. The root cause of the trouble is the old fashioned agency agreement between the manufacturer and trading concern, in which the latter is expected to pay for all advertising out of representation expenses and commission.

In the past, it was not difficult to start an engineering business in the Far East. Most manufacturers were willing to contribute from $500 upwards a year towards representation expenses and with ten to twenty such subscribers the overhead and living expenses of the agent was assured. If he did some business, so much the better. If he failed to book orders, he was not out anything. A manufacturer called upon to subscribe a stipulated annual sum in addition to the legitimate agency commission, is in no mood to incur any further large expense in advertising. The agent gets for himself all that the traffic will bear. He needs it. Travelling expenses, heavy cable tolls, squeeze, exchange losses, bank financing and other charges incidental to doing business in China leaves nothing for advertising. In a country where booking the order depends largely on the size of the squeeze,—why advertise?

Our experience of twenty-seven years publishing an engineering magazine in the Far East, fairly qualifies us to speak with some authority in these matters, and it is our firm conviction that no real progress can be made in building up a market for engineering products in this part of the world unless the advertising is paid for by the manufacturer and the copy prepared by his own publicity staff.

It can be categorically stated that the only foreign engineering manufacturers who have built up a market in Japan and China are those whose advertising campaigns are financed by the home end. In the first place there is not a single engineering firm in the Far East that can afford a publicity staff intelligent enough to draw up convincing copy for twenty to fifty different lines of engineering.

A glance at the China and Japan Hong Lists will disclose that the leading engineering manufacturers of America and Europe are represented here by not more than a dozen firms. In many instances one engineering firm will represent forty or fifty different manufacturers. These firms have unusually heavy overhead expenses and must distribute their meager advertising allowances over a vast territory, in purely local mediums.

Not one of these engineering firms, even the biggest and most prosperous, can afford to advertise all their various engineering specialties. At the utmost, all they can do is to take a limited space in an engineering publication and give a few of their principals occasional publicity. Many of these engineering firms fritter away their advertising funds in mediums that fail to reach prospective buyers of machinery. In Europe or America the publicity manager of an engineering manufacturer carefully apportions his advertising allowance and selects his mediums amongst the technical publications catering to the various industries interested in purchasing his specialties. If this appropriation was thrown away in mediums of general circulation, travel, art, financial, social, humorous magazines, and catch penny advertising stunts, that Publicity Manager would lose his job.

The Far East is divided into several sales territories, where the home manufacturer is represented by as many different agents. We have Siberia, Japan, Manchuria, North China, Central China, South China, Indo-China, Siam, F.M.S., Straits Settlements, Dutch East Indies and the Philippines ; twelve distinct spheres of engineering activity. None of these territories can support a technical publication, so to build up an efficient engineering magazine in the Far East, it must cover the entire territory from Japan to Java and take in all lines of engineering activities.

The *Far Eastern Review* after twenty-seven years, has made itself the representative engineering publication of the field it covers. It is not a purely local or China medium but an international monthly circulating in every industrial center from Hakodate to Rangoon. Yet because it is published in Shanghai, the home manufacturer and his advertising adviser, insists upon classifying it as a Shanghai medium coming under the jurisdiction of his local representative. It seems difficult to convince the average publicity or advertising director in either Europe or America, that Shanghai is the commercial hub of the Orient, the metropolis of the Far East, holding the same relation to its own part of the world that London or New York enjoys in their respective spheres. Shanghai is no longer a little Chinese treaty port, the outlet for the trade of the Yangtze Valley, but a hive of industry, a center of finance, trade and shipping for the entire Far East, the only place with the plant and facilities for publishing a high grade magazine. The *Far Eastern Review* is admittedly one of the foremost publications of its kind in the world, being excelled typographically and in its make up by few magazines in Europe or America.

Yet. because this internationally recognized authority on the politico-economic, technical and engineering problems of Eastern Asia is published in Shanghai, it is classified by the publicity experts of America and Europe as a treaty port publication, dependent for its advertising support upon the local representative of the manufacturer, who, in nine cases out of ten, needs every cent for other more pressing expenses.

Our experience is that the home engineering manufacturer who places and pays for his own advertising in China or Japan, and has his own publicity bureau prepare the copy, comes out ahead in the keen competition for business in this part of the world. Those who have been most successful have maintained a direct contact with the publisher, supplying him with all their literature, items and articles on their activities in Asia. The rapid growth of the advertising agency business in the last decade together with the tendency of the latter to hook up with other intermediaries has destroyed the old intimate relationship between the two principals, the manufacturer and the publisher. The system as applied in the United States has its undoubted advantages, but in foreign publicity, when several intermediaries come between the publisher and the manufacturer the system works out to mutual loss.

There are some advertising agencies competent to handle and prepare technical publicity but we know of none in the export advertising business. On the other hand, as we have already pointed out, there is not a single engineering firm in the Far East equipped to prepare advertising copy or furnish the publisher with these items, articles, photographs and other material which enables the latter to give proper service to the manufacturer. In many instances, it devolves upon the Publisher to design and draw up the copy for his advertisers, and while this service is cheerfully rendered, there are times when it is extremely difficult even for an all round engineering editor to prepare advertising copy for certain specialties where the value of the advertisement depends upon attracting attention to some technical improvement or superior advantage.

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Railways First

Progressive Chinese Railway Legislation

In the leading article in our January issue, attention was invited to the trend towards the creation of an absolute governmental monopoly in the ownership and operation of railways and other public utilities, which if followed to its logical conclusion, would lead to the establishment of a socialistic, if not a communistic state, with all avenues closed to private initiative. In the present condition of the national credit it is impossible for the Government to raise the necessary loans from abroad to proceed with urgent railway construction and rehabilitation. If there is to be any immediate development in new railway extensions, the funds will have to be raised in China and permission granted to private capital to build and operate secondary lines and feeders to the state system.

It is reported from Nanking that the Ministry of Railways has drafted a new Railway Law for submission to the Legislative Yuan, defining the status of Government railways and laying down the conditions under which private interests, Provincial and Local Governments, may construct and operate railways. The mere fact that such a law has been drawn up—whether it passes or not—is a sign of progress, a return to normalcy on the part of Kuomintang leaders whose intense radicalism in the first stages of the nationalist revolution and the implantation of communist ideas through slogans imported from Moscow, seemed to presage the adoption of Soviet theories in regard to private enterprise. Although this tendency has not by any means disappeared, it is encouraging to find one Minister with the strength of mind to advocate a change in the policy of his colleagues and press for the enactment of legislation which throws open his own special field of activity even though this be restricted within well defined limits. The Chikow-Shihkiachwang Railway (connecting the Peking-Hankow and the Shansi Line with a port on the Gulf of Chihli), by a private company is reported to be making progress and it is expected that work will be started in the near future. There are several other connecting and provincial lines that could be pushed ahead with private Chinese capital if the necessary permits could be obtained.

The draft Law submitted by the Railway Ministry, which consists of 28 articles, stipulates that, as a general rule, all railways affecting the communication of the country or constructed for general transportation purposes must be State enterprises ; while lines which are not constructed for general transportation purposes or whose use is confined to only one locality may be operated by private individuals in accordance with the regulations governing private-owned railways or regulations governing railways built for special purposes.

In order to develop communications within one particular province or municipality, the local Governments concerned may raise funds for the construction of railway lines in conformity with the regulations governing the construction of railways by local governments.

Private interests may, subject to the approval of the National Government, undertake the construction and operation of projected Government lines, on which construction work is not started at the prescribed date.

Foreign capital may be borrowed for the construction of Government lines. The terms of such loans must, however, be based on the principle of equality and reciprocity and be in no way derogatory to the national sovereignty.

Unless specially authorized by the National Government, no person shall be allowed to construct, extend or purchase any railway line within the limits of China's territorial jurisdiction.

No local Government, unless authorized by the National Government, shall be allowed to negotiate and contract foreign loans for the building of railways or grant to any foreigner the special privileges referred to in the preceding paragraph.

The power of administration over Government lines rests with the Ministry of Railways ; lines operated by private interests or local Governments shall be under the Ministry's general supervision.

Military transportation on Government lines shall be carried out in accordance with the Government regulations governing military transportation and such other regulations as may be jointly decided upon hereafter by the Ministries of War and Railways.

Whether in time of peace or during war, private-owned railways may be used for military transportation purposes in accordance with regulations to be formulated by the Ministry.

Public loans floated for the purpose of building railways shall not be diverted to other uses. Earnings or profits of Government railways must, after being devoted to the expansion and improvement of the railway, be applied, in priority, for the repayment of the railway debts.

The Government may, within a specified period and in accordance with prescribed legal procedure declare its intention to take over any private railway lines. During such period, the lines concerned shall not be amalgamated with other lines. The Government may also take over railway lines operated by local governments by the same procedure.

Chikow-Shihkiachwang Railway

To Link the Peking-Hankow and Tiensin-Pukow Lines

The construction of a railway, which will facilitate the transportation of products from Honan and Shansi will be commenced at the end of the month by a company formed by wealthy Chinese merchants of north China.

The railway will be known as the Chikow-Shihkiachwang Railway, Chikow being a town at the mouth of the Kien River which flows into the Gulf of Chihli, and Shihkiachwang, an important city on the Peking-Hankow Railway in Chihli Province. It will link up the Peking-Hankow and the Tientsin Pukow Lines, and pass through 21 towns and cities in Chihli, including Chaochow, Sintsi, Shenchow, Wukianghsien and Tsangchow. Chikow, the eastern terminus of the railway, can be developed into a good harbor where the coal of Shansi, can be exported instead of through Tientsin and Tsingtao.

The proposal for the construction of this railway was made by the former Peking Government, but was not carried into effect on account of uncertain political situations. During August, 1929, some wealthy merchants of North China formed a company to construct the line, the original plan, but, when the company secured permission in this connection from the Ministry of Communications in the same year, it decided to extend the line to Chikow, making the total length of the railway to 290 kilometers.

It is learned from the Government circles that $15,000,000 has been already raised by the company in question for this purpose and, as stated, construction will be commenced at the end of this month. However, in order to facilitate the construction work, the railway will be built in four sections, the first section being from Shihkiachwang to Tunglu. After the completion of the first section, the company will undertake the construction of the three other sections, namely, from Tunglu to Sienhsien, from Sienhsien to Tsangchow and from Tsangchow to Chikow.

Engineering Advertising in the Far East

(Continued from page 76)

For these and many other reasons, the engineering manufacturer in America, Europe and Japan, is not receiving full returns from his advertising expenditures in this part of the world. Unless the manufacturer takes a deeper interest in his advertising and general publicity, he will make little progress in introducing his products in these markets.

In other words, the same policy that governs the expenditure of the advertising appropriation at home, must be followed in the Far East. If engineering manufacturers expect to have their name and products widely known in this part of the world, they must use an engineering medium which reaches those interested in purchasing their specialties.

Sixty Per Cent Overhead !

Why the China Merchants Steam Navigation Company is on the Rocks

Sixty per cent of the total earnings for the maintenance of its office staff would wreck any enterprise. Yet this is what it has cost to operate the offices of the premier Chinese shipping concern, the China Merchants Steam Navigation Company. The *Kuo Min* official news report on the reorganization of the company frankly admits what foreign observers have always contended is the reason why it is impossible for foreigners to co-operate financially in any Chinese share company in which the control is exercised by the Chinese end of the partnership. The publicity given to the measures proposed to revive Chinese shipping during the past year would fill many pages of this magazine, but we have refrained from tiring our readers with schemes which seemed to have little prospect of being realized, at least until a new system of management was devised and enforced.

The picture presented by China's shipping is a sad one. The average age of ships flying the Chinese flag is 34½ years and at least half of this tonnage is ripe for scrapping. With its vast population, enormous import and export trade, numerous harbors and one of the finest inland waterways in the world, China possesses only one-eighth of one per cent of the world's tonnage. Over ninety per cent of the foreign trade of China and roughly seventy per cent of the total coastal trade is carried by vessels flying foreign flags, figures which indicate clearly the dislocation of trade that would follow any sudden legislation to exclude vessels flying foreign flags from participating in the coastal and inland waterways trade at least until provision has been made for their replacement by vessels under the Chinese flag. As Captain Brandt of Hongkong pointed out a few months ago, "it is impossible for Chinese shipowners to compete with the others in view of the enormous running expenses in the upkeep and repair of steamers, which leave no profit whatever."

If, however, the bulk of the revenues go into office overhead, maintaining idle hangers-on, friends of the manager, there is little left for real operating expenses or for paying the salaries of the officers and crew. The captains and crew of the C.M.S.N. Co., are reported to be behind in their salaries several months.

Chinese officials in their campaign for the abolition of extraterritoriality, invariably emphasize the encroachment on China's sovereignty by foreign shipping concerns who have driven Chinese shipping not only from the coastal but the navigable inland waterways. The Chinese attribute the decline of their shipping and inability to compete with foreigners to the unequal treaties which deprive the government of the right to impose protective taxes on foreign vessels plying in Chinese territorial or inland waters, but they say little about the system which makes it impossible to operate their lines even if the field was entirely open to them. When, in addition to the sixty per cent overhead, it is recalled that the vessels of the C. M. S. N. Co. have been commandeered by the military during the campaigns of the past decade, leaving few vessels for commercial service, it is a wonder that the company has been able to survive at all.

The permanent problem to shipowners on the China Coast, is the ever present menace of piracy, which is invariably practiced by gangs travelling in the guise of passengers. The only satisfactory protection against this danger is the presence on board foreign vessels of military guards. Not only on the coastal services is this true but even on the rivers where bandit and communist attacks on vessels necessitate the presence of foreign war-ships for the protection of their shipping. Pirates infest the Canton delta, the mouth of the Yangtze and have their lairs scattered all along the coast. Like banditry in the interior and kidnapping in the cities, piracy on the waters of China is endemic. Only the possession of a large fleet of gunboats and small cruisers by the Chinese Government and a determination and will to stamp out this menace, will make the waters of China safe for navigation.

About the only way that the China Merchants Steam Navigation Company's fleet and services can be put on its feet is through a loan of ten to twenty million dollars and it is extremely doubtful whether this sum can be raised until the prevailing system of administration is remedied. For every million dollars spent on reorganizing or building up the Chinese mercantile marine, another million will have to go into the building of new war-ships to protect the investment, a repetition on the water of the methods which have converted China into a military paradise. Where is the money coming from to build a huge fleet of war-ships for China ?

There has been considerable publicity the last month about an alleged proposal submitted to Nanking by Captain Robert Dollar to co-operate with the Chinese in the establishment of a formidable Sino-American shipping company, in which the ships would be supplied by the Americans and the management would remain under American direction. The ships were to fly the Chinese flag, the Company registered under Chinese law and operate under the supervision of the Chinese Board of Navigation. It was reported that the Chinese submitted counter-proposals which accepted the use of American capital in the form of a large loan to be redeemed in fifteen years and the personnel and administration of the enterprises to remain in the hands of the Chinese Government.

Although the Robert Dollar Company cabled from their head office in San Francisco denying the report, its circulation created considerable adverse comment amongst Chinese shipping interests. Captain Robert Dollar may be quite willing to assist in reviving Chinese shipping under reasonable conditions, but when it comes to lending a large sum leaving the entire supervision of the enterprise to the Chinese government, the veteran American shipping magnate and great friend of China, will probably be guided by those instincts which he imbibed in the land of his birth. Captain Dollar is a fine type of American, but, he remains a canny Scotchman.

The following *Kuo-Min* news item tells its own story :

"A thorough reorganization of the various branch offices of the China Merchants Steam Navigation Company in order to increase administrative efficiency as well as to prevent leakage is now being planned by Mr. Li Chung-kung, Special Commissioner for the Reorganization of the Company.

"The Company has upwards of thirty branches. The aggregate earnings run to several million dollars every year but due to the heavy expenditures as well as mismanagement in these branch offices, the Company has had to sustain large annual deficits for the past few years. Such a state of affairs necessitates drastic reform.

"According to the plans now under consideration, the annual expenditures of the branch offices, which amounted to as much as 60 per cent of the total earnings in the past, will hereafter be reduced to 15 per cent for all branch offices with the exception of Shanghai and Hankow, where the annual expenditure must no exceed eight per cent of the net earnings.

"Where branch offices are entrusted with the administration of real estate, the annual expenditure for upkeep and repairs must not exceed five per cent of the net revenue. The various branch offices will also be divided into several grades according to their degree of importance.

"As an incentive to staff members, special bonuses will be given to those who render meritorious service. Ten per cent of the annual allowances for each office will be set apart to constitute a Bonus Fund.

"The present practice of directors of branch offices appointing all their subordinate staff members often results in the complete change of staffs following any change of directors. This tends greatly to impair the general efficiency, and hereafter all heads of departments in the branch offices will be directly appointed by the General Administration Office at Shanghai. Staff members other than departmental heads are to be appointed at the recommendation of the branch office directors.

An Osaka newspaper is authority for the report that the Harima Dockyard Company, Ako-gun, Hyogo-ken is to build a war-ship of 12,500 tons for the Chinese Government.

The Chinese Ministry of the Navy has placed an order with the Kiangnan Dockyard and Engineering Works also for the construction of a new gunboat to be known as the *Chienwei*.

Two gunboats, namely the *Tatung* and *Jen-sheng* were built by the Kiangnan Dock for the Ministry last year, and have since been commissioned for service in the National Navy.

A German Industrial Loan to China

THE report of the German Industrial Commission which visited China last year has aroused great interest in Germany. "Given peaceful condition," the commissioners' report declares "China offers exceptional possibilities in its economic development."

All the preliminary conditions for the industrialization of China already exist, the commission point out. When industrialization take place, China will be in a position to import goods of better quality than she now does, and what is very important, she will wish to import large quantities of machinery and other equipment for the manufacture of goods herself within her own borders "China" the report says, "ought to become a relatively large market for iron and steel."

The report of the commission lays stress on the poverty of means of communications in China and the good business that might be done in remedying this state of affairs. In Hankow, the report states, American wheat which has travelled 13,000 kilometers, is sold at one third the price of wheat grown in the neighboring Chinese provinces." Motor-car imports into China, the report states, have been steadily growing in recent years, but as yet virtually no German motor-cars have been sold there.

Despite the huge size of China's population, the country, the commission declares, is not over-populated. Six-sevenths of its population however are concentrated on one third of the land and in consequence much cultivatable land is left fallow. Moreover, primitive methods of cultivation, the absence of adequate canalization and other technical causes hinder China's production of agricultural produce.

Instancing the enormous waste caused by civil war, the report points out that the average cost of a Chinese soldier is 500 marks a year, while the average income of a Chinese peasant is about 150 marks a year.

Another result of the visit of the German Industrial Mission is a loan project that is now being discussed at Nanking between German financial representatives and Mr. T. V. Soong, Finance Minister. One report states that a powerful German industrial combine is negotiating with the Chinese Government for the undertaking of industrial enterprises in China. This combine, it is stated, is prepared to put up 24,000,000 gold marks for industrial undertakings in the Yangtze Valley and, if this project proves successful industrial plants will be put up later in North China.

Another report states that the German loan will be of 20,000,000 gold marks, to develop mines in China.

Nationalization of Chinese Mining Enterprises

PLANS for the nationalization or reorganization of various mining companies in the country so as to accelerate development of the mining industries are now under consideration by the Ministry of Industry. The program formulated by the Ministry may be briefly described as follows :—

1.—Kailan Mining Administration : This Company was formed through the amalgamation of the (British registered) Chinese Engineering and Mining Company and the (Chinese) Lanchow Company. According to the agreement signed between the two Companies, the (Chinese) Lanchow Company has the right to take over the Kailan Company. In view of the fact that this has not been done in accordance with the agreement and that the Kailan Company has never abided by the laws of the Chinese Government nor paid the prescribed taxes, the former Ministry of Agriculture and Mining, in conjunction with the Ministries of Finance and Foreign Affairs, organized a special Reorganization Committee for the reorganization of the Administration. Due to the disturbed conditions in the country, this Committee has, however, failed to achieve anything.

2.—Luta Mining Co. : This Company operates the Tzuchuan and Fantze coal mines and the Chinlingchen iron mine, all of which are in the province of Shantung. As a result of usurpation of powers by the Japanese, a dispute had arisen between the Company and the Shantung Provincial Government. The former Ministry of Agriculture and Mining had obtained the sanction of the Executive Yuan for the establishment of a special Committee for the reorganization of the Company, which, however, has not yet been formed. The Ministry of Industry will endeavor to carry out what the former Ministry has left unaccomplished.

3.—Chungyuan Mining Administration : This Company was formed jointly by the Government Authorities and people in Honan in competition with the (British) Pekin Syndicate. In the 16th year (1927), the Kuominchun rebel leaders took over the Company. Following the liquidation of the rebellion and the withdrawal of the Kuominchun from Honan, the administration of the Company was taken over by the Honan Provincial Government. The condition of the Company was rather complicated, there being also many pending disputes between the Company and the Pekin Syndicate. The former Ministry of Agriculture and Mining had also obtained the sanction of the Executive Yuan for the establishment of a special Reorganization Committee to be jointly organized by the Ministries of Foreign Affairs, Railways and Mining, and the Honan Provincial Government. Owing to the Honan Government failing to appoint its representatives, the Committee has never actually been organized. The Ministry of Industry is now arranging with the Honan authorities to send delegates immediately to form the Committee.

4.—Hanyehping Mines : At first, special Committees were appointed by the Ministries of Communications and Agriculture and Mining for the reorganization of this Company. Later on, the 2nd Plenary Session passed a resolution providing that the National Government should appoint a special Commissioner to carry out the reorganization. The Ministry of Industry is now giving the question its careful consideration and will immediately submit appropriate recommendations to the Government for approval.

Following the suspension of the mines, the Kiangsi Provincial Government, with a view to maintaining the livelihood of the mine workers, had appropriated funds to continue the operations of the Pinghsiang coal mine, which formed a part of the Hanyehping mines. Due, however, to shortage of funds, the mine had eventually to be suspended. Plans are being formulated by the Ministry to facilitate the reopening of this important mine.

5.—Lincheng Coal Mining Administration : The dispute over this Company which arose some time ago between the Hopei Provincial Government and the private shareholders has not yet been settled. Though the Ministry of Agriculture and Mining had taken steps to bring about a settlement of the question, its efforts were frustrated through the Hopei authorities refusing to send delegates. The Ministry will endeavor to effect a speedy settlement of the dispute so that operations may be resumed.—*Kuo Min.*

Chinese Petition Cancellation of Pekin Syndicate Concession

It is significant that the proposal to nationalize the leading coal mines of China as outlined in the preceding article, should be followed almost immediately by a petition from the "Honan Association for the Restoration of Mining Privileges" calling upon the Government to cancel the concession granted to the Pekin Syndicate for operating coal mines in Honan.

The petition alleges that the Pekin Syndicate has failed to fulfill the terms of Article 41 of the Agreement, which provides that non-performance of any part of the Agreement will render the whole inoperative, therefore the concession has really long ceased to be effective. Owing to non-co-operation on the part of the people in Honan as well as Chinese laborers, the collieries have suspended operations since 1925.

It is reported that the Syndicate, under the pretext of providing work for the unemployed laborers, has recently petitioned the Government for permission to resume operations. Moreover, the petition says, the Ministry of Foreign Affairs is said to be contemplating the creation of a Committee for the reorganization of the (Chinese) Chung Yuan Company for the purpose of settling various disputes pending with the Pekin Syndicate. Such a step, the petition emphasizes, runs counter to the common desire of the people in Honan.

Urging that the request of the Syndicate to resume operations be rejected, the petition says that should the Government refuse to comply with their petition, the only course left open for the people is to adopt a policy of absolute non-co-operation with the Syndicate.

The petition concludes by urging that since the Company has failed to carry out the terms of the concession, the privilege be cancelled and that every assistance be extended to the Chinese Chung Yuan Company. The people will, on their part, assist in the repayment by the Government of the debts owing to the Pekin Syndicate by the Taokow-Chinghua Railway.

Getting Yellow River Water on the Saratsi Plain

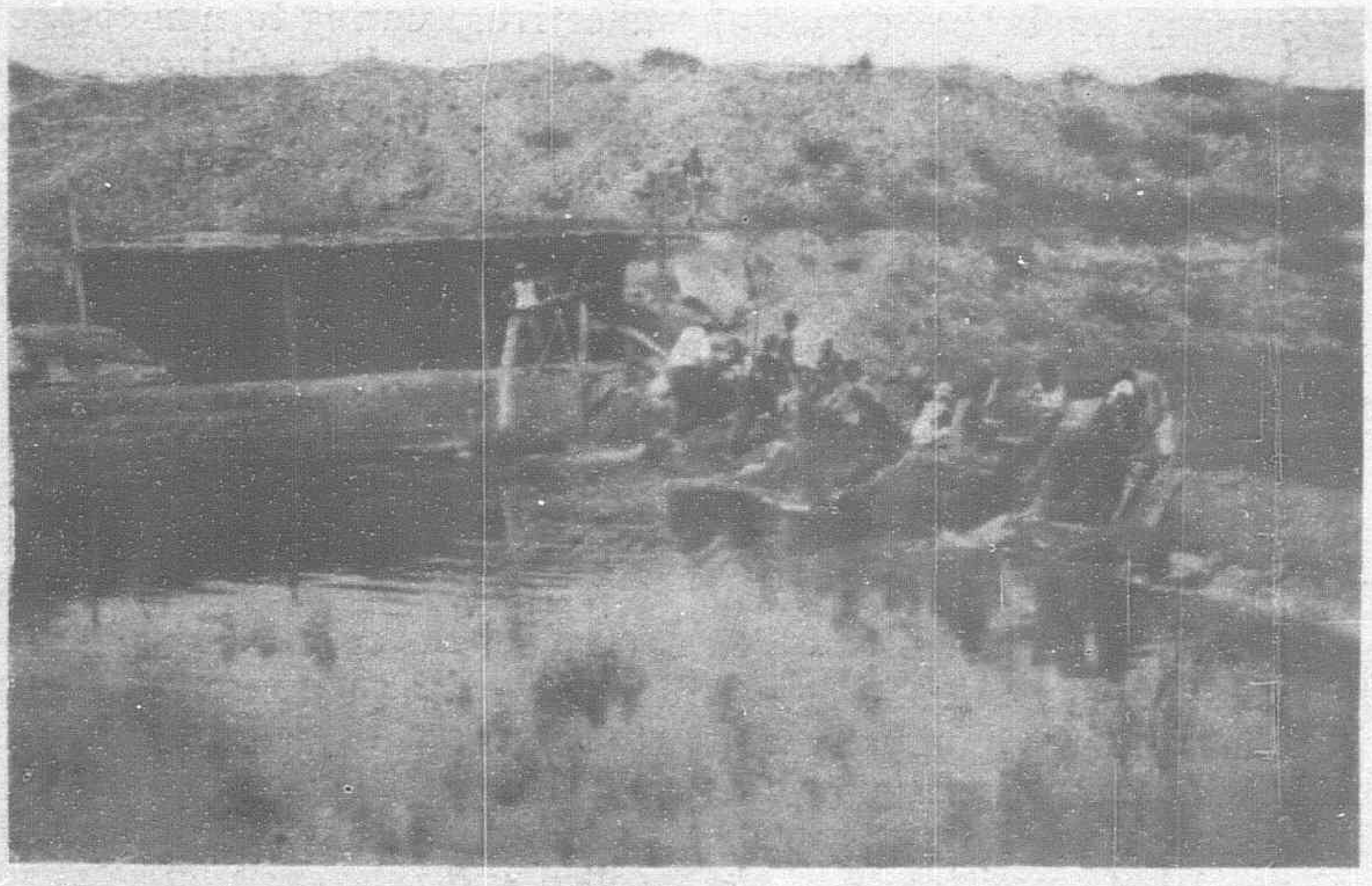
By O. J. TODD, Field Manager of Saratsi Project, and Chief Engineer of China International Famine Relief Commission

As dry years followed one another in Suiyuan and fields were yielding less and less, the idea of getting more water on the land in the Saratsi region became general until, to meet serious famine conditions that had resulted from drought, in the late spring of 1929 an irrigation project was actually undertaken to give at least partial relief to an area of nearly 2,000,000 mu of flat farm land lying south of the Peiping-Suiyuan Railway and north of the Yellow River immediately east of Tengkow Station on the railway. Partial irrigation had previously been furnished the northern portion of this district at points near gorges in the mountain range lying a mile to two miles north of the railway. After summer showers in the mountains the streams that poured onto the plain from several of these gorges gave water that made crop growing a dependable industry in their immediate vicinity. But the area served by these streams was very limited and the places along the railway where wells for irrigation were practical, did not make one continuous strip. Where good well water is found large towns have grown up as in the case of Saratsi, but half a mile to the south this water supply becomes exhausted.

Pumping with "Dragon" Pump Near Intake, Satochu Works, July 14, 1930

To meet this need a main canal was decided upon that takes off from the Yellow River near Tengkow Station and goes almost directly east for some forty miles for the purpose of bringing additional water to the area between that main canal and the Yellow River, and perhaps later a narrow strip north of the canal. For the present the laterals are laid out only to the south in which direction there is a very slight slope in the terrain. To the east the slope of land permits a gradient slightly flatter than one in eight thousand. The laterals have a gradient to the south of one in ten thousand or none at all in some cases. Some sedimentation must take place requiring annual cleanings, but with proper use of the gates this should not be cause for anxiety when one considers the low percentage of silt carried by the Yellow River in this region even at flood time.

The main canal is sixty feet wide on the bottom at its intake and forty five feet at its eastern terminus forty miles to the east. The side slopes are one on one and a half. For the first few miles the average depth is ten feet; to the east it averages eight feet or less. The laterals, with similar side slopes, and a bottom width of ten feet, have depth of from ten feet in the western section to seven or eight feet in the east. These laterals are spaced approximately three miles apart. (Dimensions are given in English units for convenience of the reader though the surveys and monuments are made in the metric system: conversions are made to the Chinese "fang" on earth and stone work for the convenience of the workmen).



"Dragon" Pumps and Centrifugal Pump Unwatering "Wet Stretch" Near Intake, July, 1930

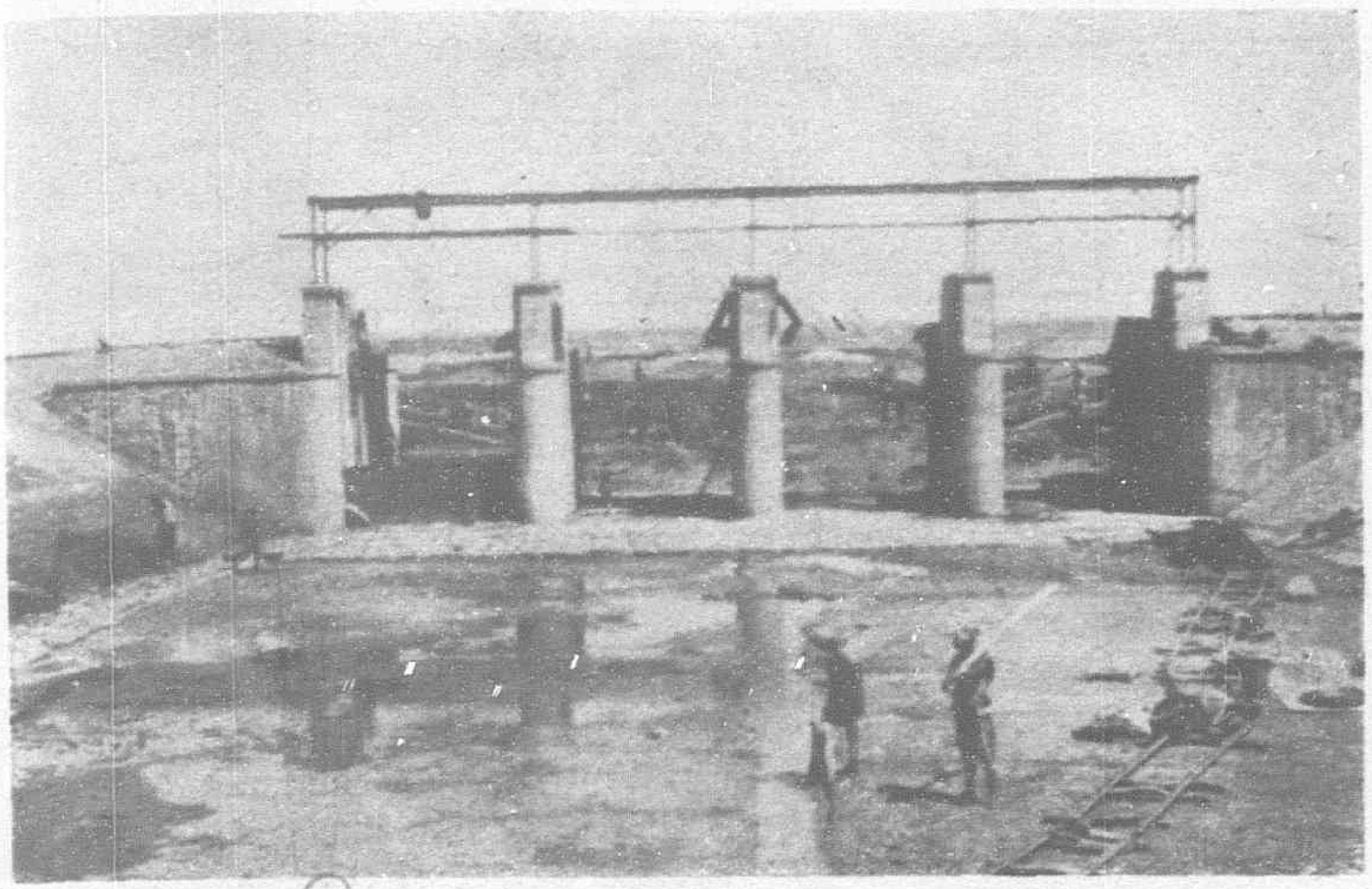
During the summer and fall of 1929 while this work was being begun there was extensive use made of the cheap labor incident to the famine and little was done in the line of construction aside from earthwork on the main canal. Most of the engineering problems, aside from the general lay-out of the canal system, were left over for the 1930 season. In the fall of 1929 the foundation was placed for the Head-gate at Intake and one abutment was built. Otherwise no special structure work was begun, though operation of the quarries continued throughout the winter. Heavy freezing stopped the earthwork the first of December. Soon temperatures dropped to 40 degrees (Far.) below zero and the Yellow River became frozen over, the ice being three feet thick.

In early April spring work began and by mid-May 5,000 men were working on excavation. Beside clearing up the excavation on the main canal, that had been left from the previous year, the first six laterals were begun. From Intake to a point directly south of Saratsi, a distance of sixteen miles, the main canal was completed to grade with the exception of 100,000 fangs which will be dug early next spring. None of the first six lateral, was completed though No. 4 and No. 5 were nearly done by July when all men were moved to main canal work.

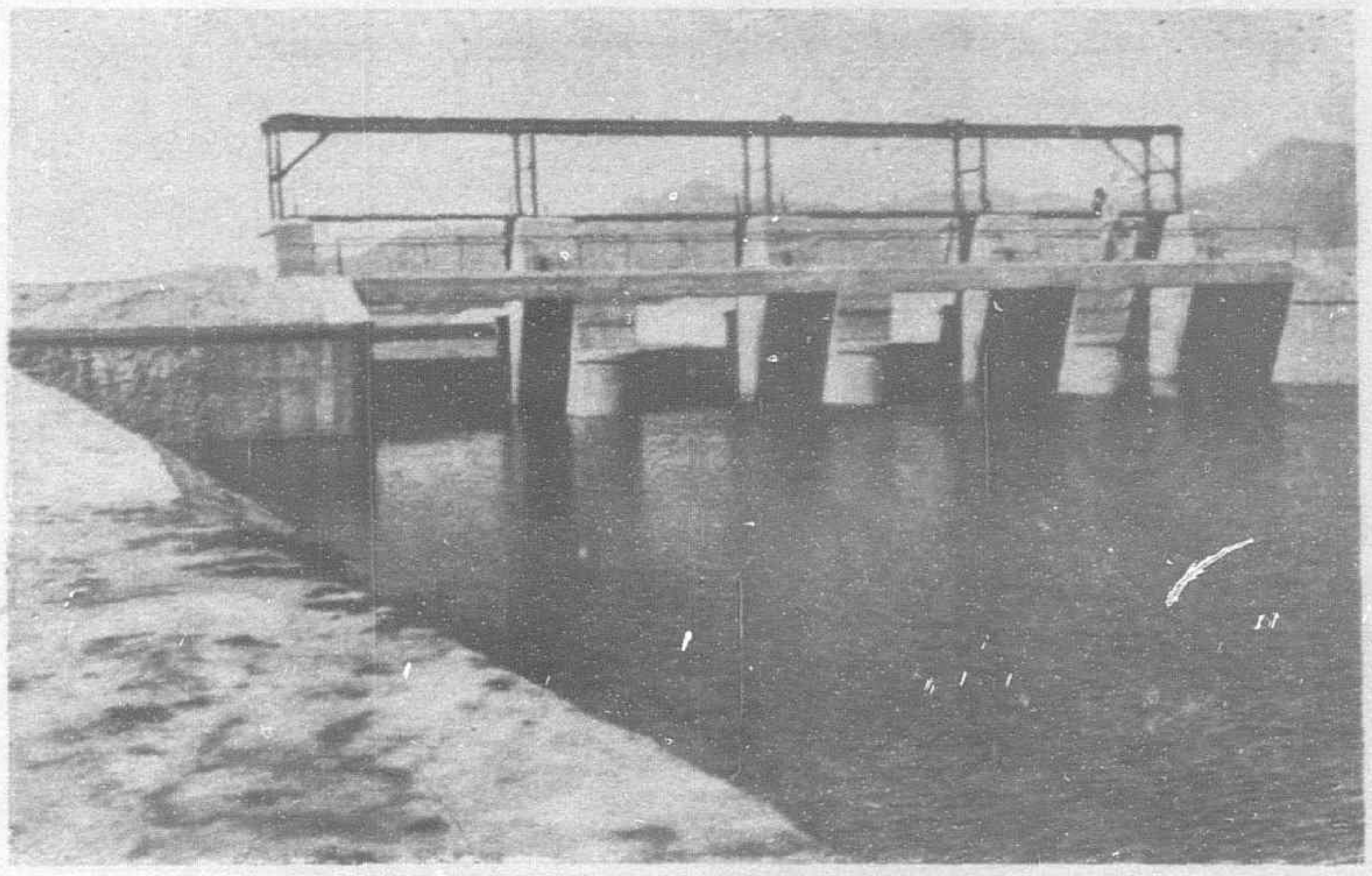
Rains in late May so encouraged the farmers that nearly all went to their fields and a labor shortage was faced before the first of July. For the remaining four months we had less than 1,000 men on an average. The demand for labor on the farms made it desirable not to compete by raising rates unduly on earthwork. In the spring months men are less busy and can be obtained locally in sufficient numbers.

Early in April studies were begun on currents and shiftings of the Yellow River near the Intake. Many gagings and soundings were taken until the most economical location for the submerged weir was determined. Also many samples of river water were tested at various stages to get silt content. Surveys were made of the Intake region to give exact channel dimensions, alignments etc. The results of these studies showed that probably the extreme low water flow at this point is close to 4,000 second-feet, and the maximum flood flow is around 150,000 second-feet or a third that to be expected in eastern Honan. Also the silt content is remarkably small compared with that in western Shantung where floods give muddiness up to 10 per cent by volume against little over 1 per cent at Tengkow. In medium to low water this percentage drops to a tenth of 1 per cent. These data were most encouraging in view of the low velocities (always under three feet per second) that will prevail in the canal system. The annual cleaning of the main canal will therefore not be such a serious matter as had been predicted be those who have not made careful tests.

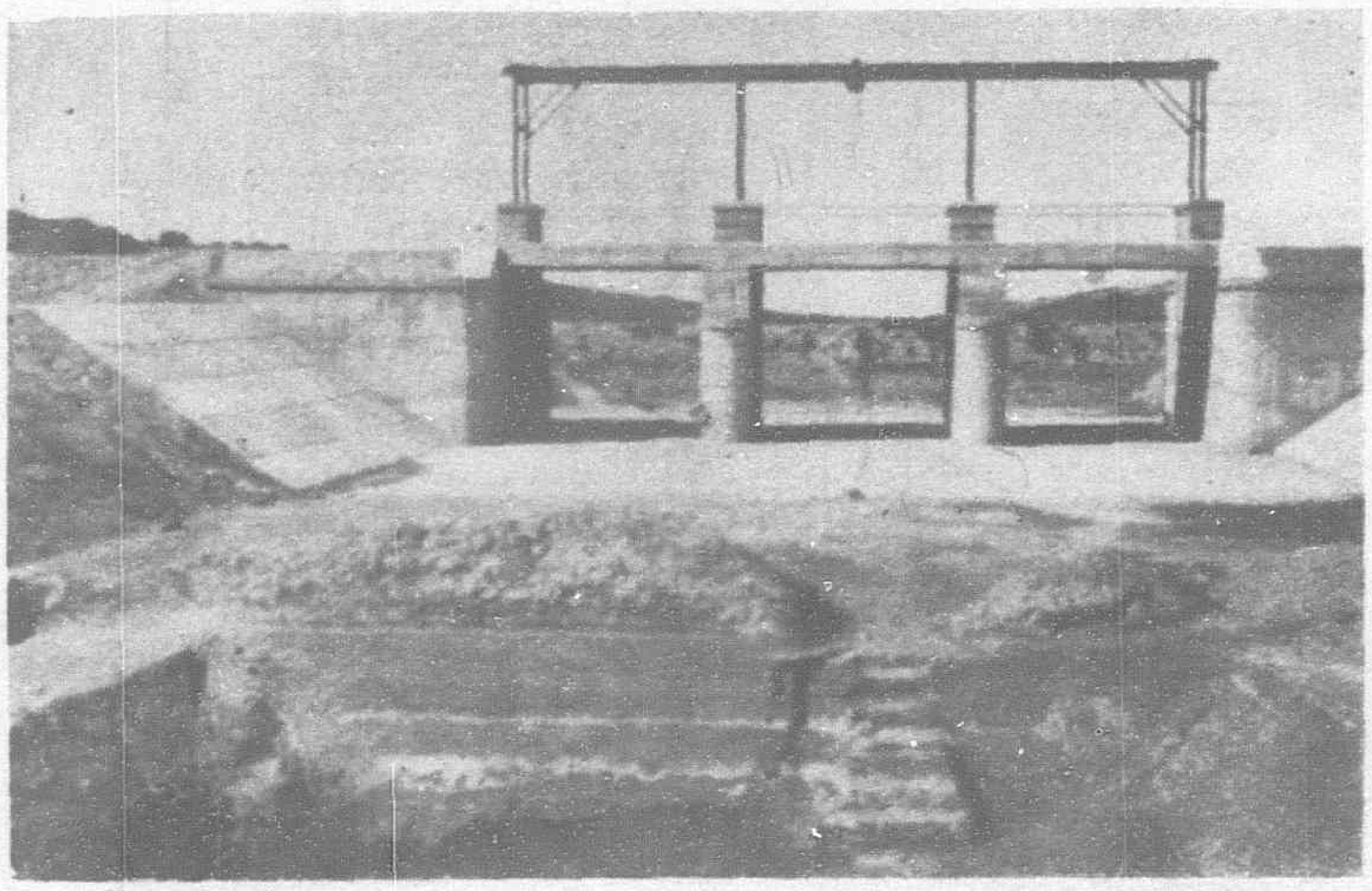
The fluctuation from extreme low to extreme high water at Intake is a little under ten feet. Flood flows coming from the steeper regions of Kansu have



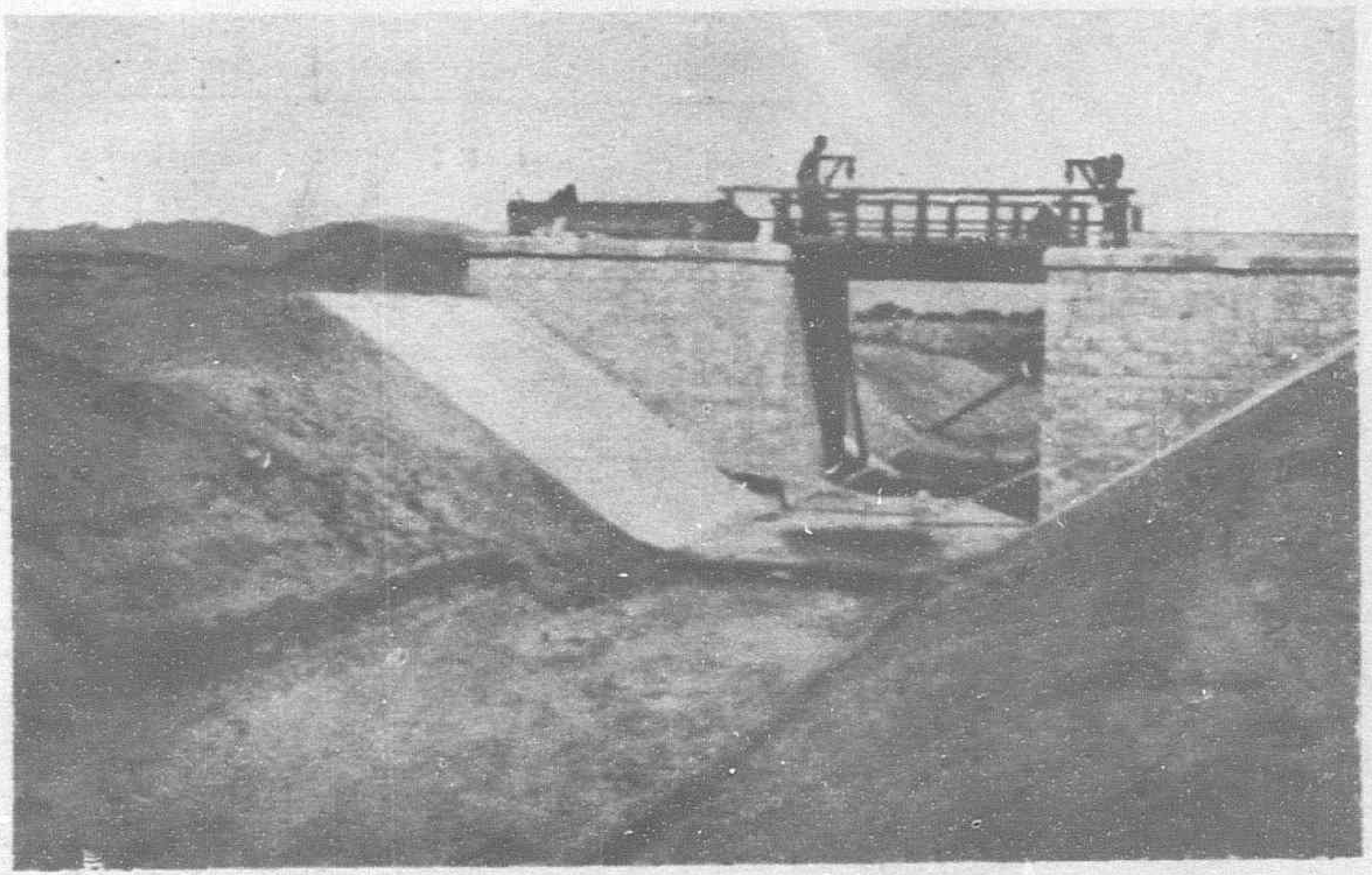
② Head Gate at Intake, July, 1930



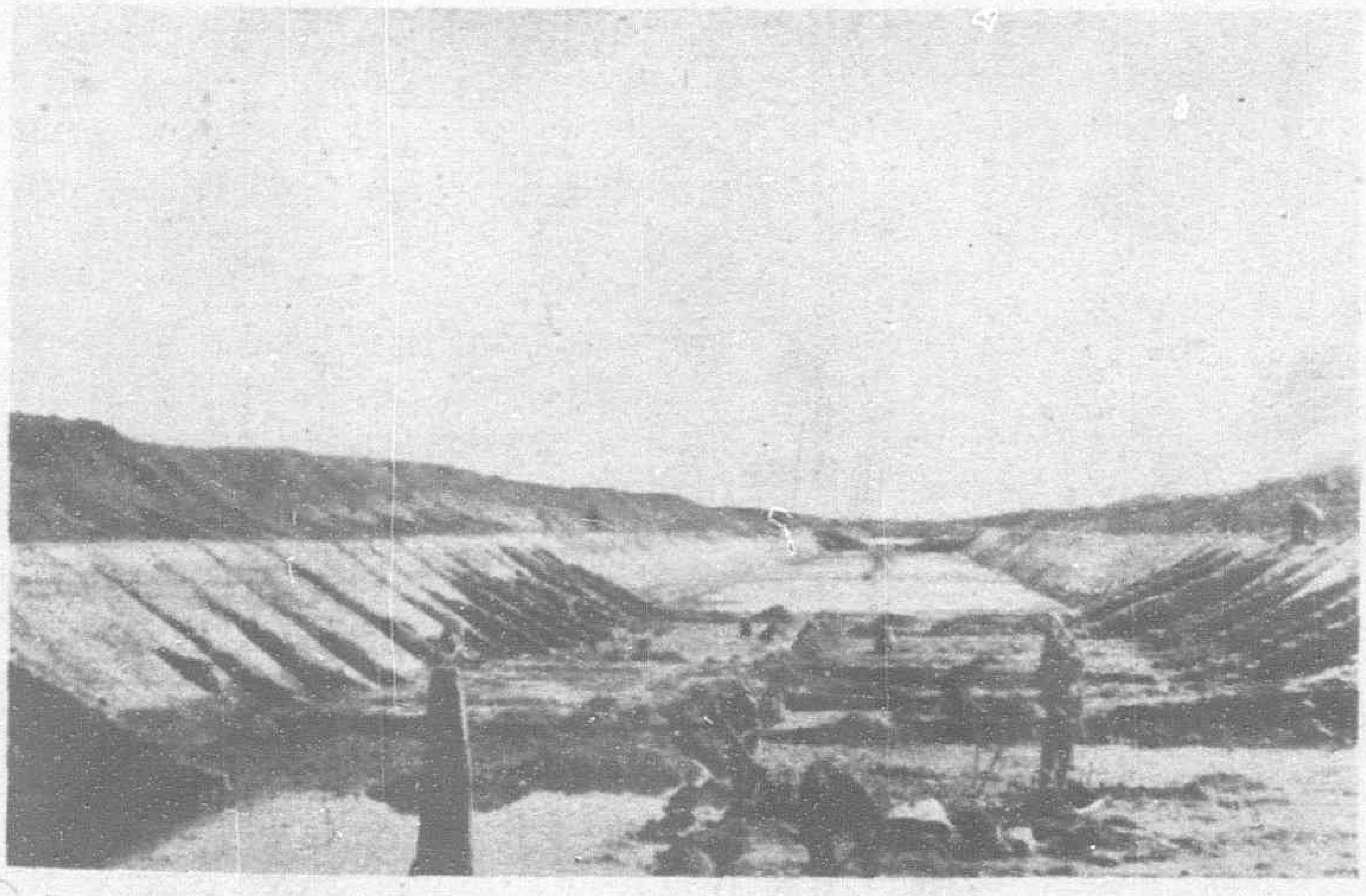
③ Intake Gates, September 26, 1930



③ The Check Gate at Chitsomoan, September 26, 1930



④ Lateral Head Gate, No. 4, Early October, 1930



③ Completing Main Canal to Grade at Intake, September 26, 1930

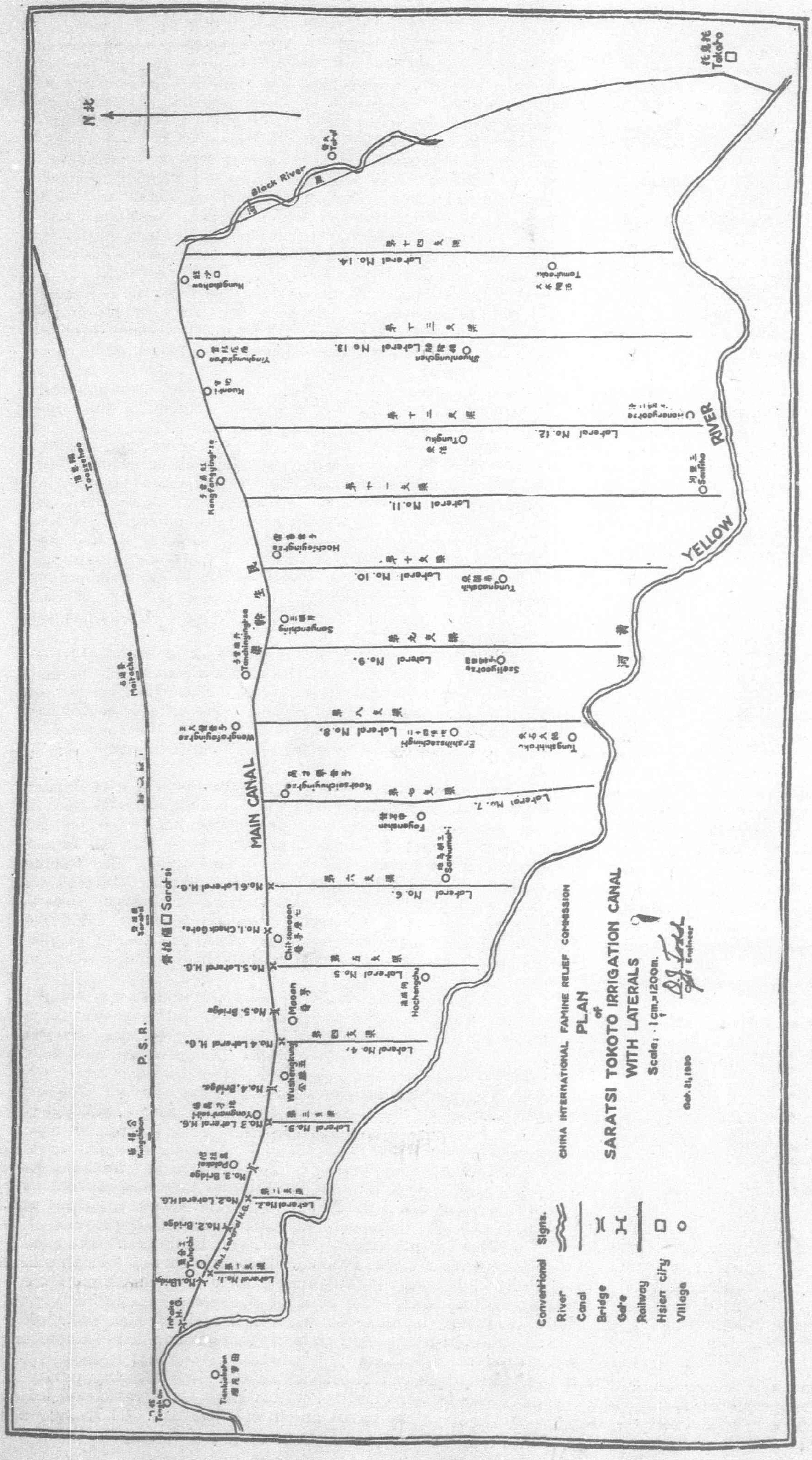
① Lateral No. 4 in Early June, 1930

ample time to be "ironed out" as they pass through comparatively flat country for over four hundred miles before reaching our Intake near Tengkow.

The rapidity of erosion of rather new mud banks and new made land which is mostly of loess formation on the south east bank near Intake depends very much on how the currents in high and medium water can be controlled. The north east banks are quite staple due to gravel from the near-by mountains, mixed with clay, having formed current-resisting banks. Also at the Intake site there are layers of very tenacious clay from six to ten feet below the ground surface on the north bank. These are a natural aid to stability for the Intake structures.

The Head Gate for the main canal was completed in July. The main structure is of concrete masonry resting on piles driven well into the clay and loess sub-soil and protected in front by a row of plank sheet-piling driven ten feet below the canal bed. There are four openings each fourteen feet wide provided with two gates for convenience in raising and lowering. These gates of steel were made in Tientsin. Two Yale chain blocks travelling on light carriages over tracks supported by a steel frame are employed for raising and lowering the gates. Immediately back of the gates as a part of this structure is a reinforced concrete bridge capable of carrying loads up to five tons and adapted to automobile as well as cart use.

Before the end of August all the stone masonry paving of the banks in front and below this Head Gate was completed as also was the stone paved apron and approach. The wing walls to the abutments of the Gate are of stone masonry. Also all the



stone masonry bank protection along the north-east shore of the river both up-stream and down-stream from the Intake channel, was completed, though in this part of the work mortar was not used in the joints. A heavy toe wall was employed and large stones weighing up to 300 lbs. each were placed so that a smooth surface was obtained.

On the south-west shore stone was not laid with the same care as quarry supplies were inadequate and that section of the work must be done next spring. This year stone work on that side of the river was in the nature of loose riprap to the extent of a thousand fangs (4,000 cubic yards). This is for the purpose of protecting the south-west end of the submerged weir and the adjacent banks from erosion from cutting due to deflected currents in high water. It must be supplemented by stone groins, one to be placed on the same side of the river about 200 yards above the weir and the other 400 yards farther up-stream on the north bank. This part of the work must go over for the 1931 program since quarried stone has not yet been secured in sufficient quantities delivered at the site.

For completing the submerged weir to give a more dependable flow in the main canal during low water periods, an additional 3,000 fangs of stone will be required. This is now being quarried nearby and will be at the site by May next. The timber towers on concrete foundations for supporting a steel cable to span the river at this point, were placed in June 150 yards below the intake channel. The two barges, of 25 tons capacity each were constructed and used on rock transport during the summer. They will be employed with the cable system in transporting to place the stone for building the submerged weir. A mere beginning was made in August in laying stone at the north end of this weir. Fortunately stone is obtainable in a suitable quarry three miles from the Intake though transport to the work has been slow. Only 3,000 fangs were delivered this year.

From the Intake immediately to the east the main canal has presented a problem in hand excavation that has given some trouble since native labor seriously objects to working in wet places. A stretch of canal over two miles long had been dug to something over two thirds the correct depth in early 1929 under Provincial management. Spring water coming in had forced the superintendent to abandon this work. An ice jam last winter put Yellow River water over the banks and filled this canal with water. Therefore a problem of drainage by ditching and pumping faced us this year. The water table was lowered to the proper canal grade and the work of completing this stretch of canal was well under way before fall. The first mile is nearly completed and the rest will be done next spring. Chinese "dragon" or "ladder" pumps were used as well as foreign centrifugals. The latter were used where lifts of more than three feet were necessary. The problem was too large for the basket method to solve. The correct handling of this water problem was one of the outstanding contributions of our engineering staff to this project. The introduction of three centrifugal pumps operated by eight and 10 horse-power kerosene engines materially helped in the solution of the problem. Altogether about $5,000 was spent in this work of unwatering the "wet stretch."

In July and August the Check Gate across the main canal at Chitsomoan was built. This concrete structure, resting on piling driven into the loess-clay soil ten feet below the bottom of the canal, has three openings for gates each fourteen feet wide. Here single gates of steel are used instead of two to the opening as at Intake. These gates are Tientsin built and each weighs two and a half tons. They are eight feet high. A steel frame over the main structure carries a Yale chain block on a light steel traveller similar to the arrangement for gate raising at the Intake. As with the Head Gate, this Check Gate has a reinforced concrete bridge immediately back of the gates. The cost of this structure was $15,000 (silver), including steel gates and fixtures, though gravel, sand and cement were all hauled by native ox-cart five miles from the railway. The Head Gate at Intake, where the haul for materials was about a third as great, cost $21,000 (silver), unit costs being very similar for the two gates.

Five timber bridges were constructed between the Intake and the Chitsomoan Check Gate. These are of Oregon pine with strong bolt fastenings. Pile bents sixteen feet apart are driven into tight soil eight feet below the bed of the canal. These bridges will carry five ton loads and stand without much repairing for ten years. The cost of these bridges is little over $300 silver per sixteen foot span or $1,800 for four full spans plus two twelve foot approaches. They are twelve feet wide between railings.

Concrete Head Gates were built for the first six laterals, the first one of these structures being equipped with a concrete bridge over the twelve foot opening while the others have wooden bridges. Stop logs instead of steel gates will be employed for these gate openings. These logs are being fitted with rings and iron stiffeners at our Saratsi shop and are stored there for spring use. These Head Gate structures cost $2,300 each including equipment.

It will be noted that gates and bridges are so planned that canal boats ten to twelve feet in width can ply all laterals as well as the main canal for moving grain or other materials. Navigation will be an important factor in the development of this irrigation system.

Five wooden bridges for use on the laterals about two miles below the main canal have been fitted at our Intake shops and are stored there for erection next spring.

RAINFALL DATA FOR SUIYUAN STATIONS

	Saratsi *M.M.*	*Inch*	*Tengkow (Intake)* *M.M.*	*Inch*
1929				
July	103.3	4.067	—	—
August	102.6	4.039	—	—
September	12.4	0.488	—	—
October	2.03	0.008	—	—
November	—	—	—	—
December	19.05	0.750	—	—
1930				
January	—	—	—	—
February	13.0	0.512	—	—
March	—	—	—	—
April	—	—	1.8	0.007
May	44.0	1.732	33.0	1.300
June	23.0	0.905	32.0	1.260
July	59.7	2.350	66.0	2.600
August	13.2	0.519	3.76	0.148
September	59.2	2.330	50.08	1.971

Rainfall in both July and August was light making the summer an ideal one for construction. The water table dropped so that great pits had to be dug six feet below the bottom of the main canal to get water for concrete work in July, August and September. The total rainfall for the first ten months of the year has been less than eight inches at Saratsi and Intake. (See rainfall table).

As this work for building "special structures" has progressed through the summer and fall [of 1930] the natives of Saratsi and vicinity have become more interested and now there is a general demand that the project be completed in the early spring so that Yellow River water may be put on the adjoining lands. The larger land owners are especially anxious that the canal work be completed promptly. It is thought that next spring there will be sufficient local labor through April and May to dig the remaining 250,000 fangs of the main canal. The completion of the laterals will follow rapidly. Only normal rates of pay on the fang basis are offered as it is not considered good policy to bid against farmers for the limited labor supply nor to complete the work without a fair share of local co-operation.

Next spring another Check Gate and four to six Lateral Head Gates will be constructed. Probably five more timber bridges will be built across the main canal. Other structures such as timber bridges across laterals will be built as local demands occur. The submerged weir at Intake is one of the structures that will be given close attention in the spring. Along with the completion of this goes groin training work and south shore dikes with stone paving, as indicated in a preceding paragraph.

Co-operation on the part of the Peiping-Suiyuan Railway continued throughout the summer and fall. Good facilities were given for movement of cement, timber and other supplies, all this being a free contribution by the Government toward this work.

Local disturbances caused by armed bands coming north of the Yellow River into the Saratsi region on October 10, and later made it advisable to close the work three weeks earlier than had been planned. This did not, however, stop completion of our structures which were already practically completed for the year. It only curtailed the amount of earthwork that had been planned for October and early November.

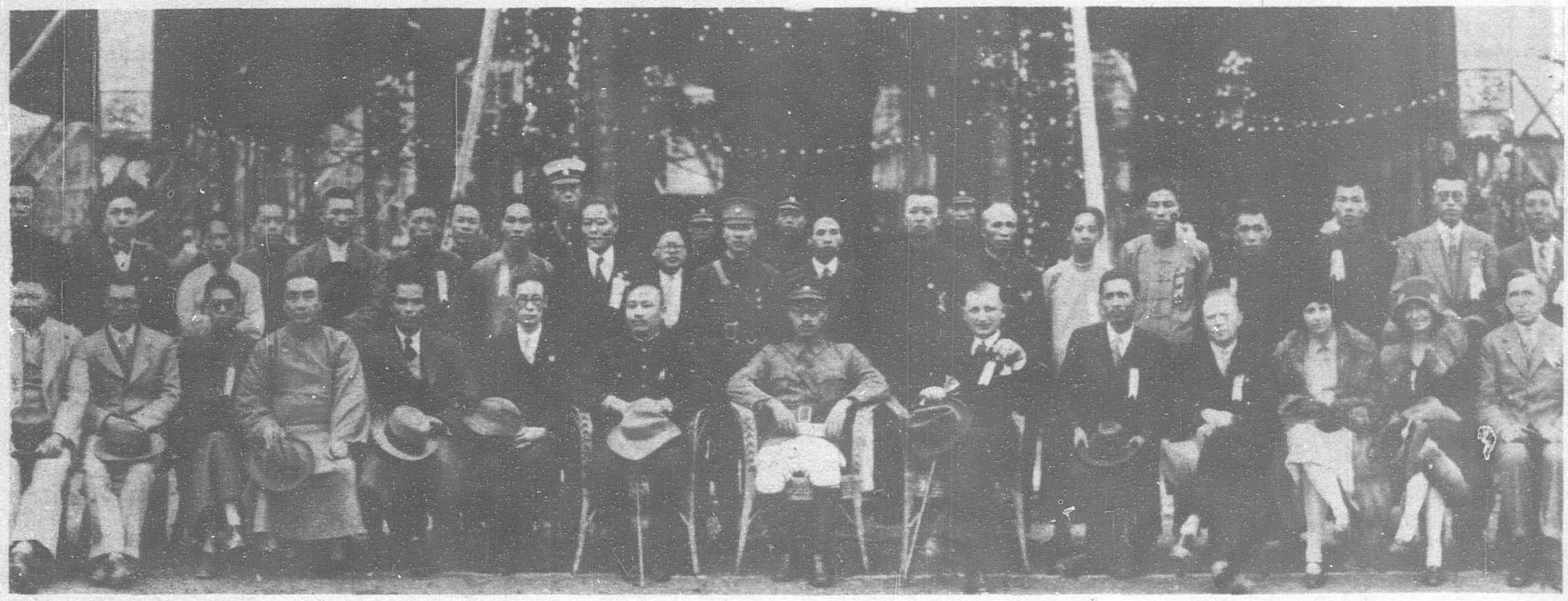
One junior engineer remains on the work at Saratsi through the winter to check deliveries of rock, sand and gravel being brought in for the spring construction program. The work will reopen as early in April as the season permits. The extreme cold of last winter caused frost to go so deep that it was still encountered in excavation in late May in the bottom of our main canal and at Intake.

As this work is financed by both the Suiyuan Government and the China International Famine Relief Commission there is always apprehension about completion of the work when political disturbances come. It seems likely, however, that all unpaid pledges made by Suiyuan will be met before spring. The Famine Commission has already paid in approximately $400,000 (on a loan basis) which is more than originally pledged, towards the estimated total of $750,000. Another allotment of $100,000 by the Famine Commission is now available from newly donated American funds to make the completion of this work an assured fact.

There is a possibility of additional river training being required at Intake which would bring the cost of the entire project up to $800,000. This includes the main canal, fourteen main laterals and head gates for same, ten wooden bridges across the main canal, beside the three concrete ones on the Head Gate and two Check Gates. It also includes the submerged weir and all necessary training work at the Intake. It does not include sub-laterals which will be built by the land owners as needs require. Perhaps one wooden bridge will be built across each lateral in addition to the bridge that is a part of each lateral head-gate. Added to the above a good telephone system and auto road connecting Saratsi with the camps along the main canal will be left as a part of the construction equipment that becomes a permanent fixture.

Most of the more difficult engineering problems of this undertaking have been met and carefully studied this year. Aside from the weir construction and the river training work above the Intake the remaining work for 1931 is comparatively simple.

Our 1930 overhead was light as compared with 1929. We were favored by the services of a number of foreign volunteers both in the engineering and business side of the work. They rendered very efficient service as also did a number of engineering students from Peiping's North China School of Engineering Practice. The Principal of this school, Mr. S. M. Dean, gave five months of his time to this work particularly on special structures.

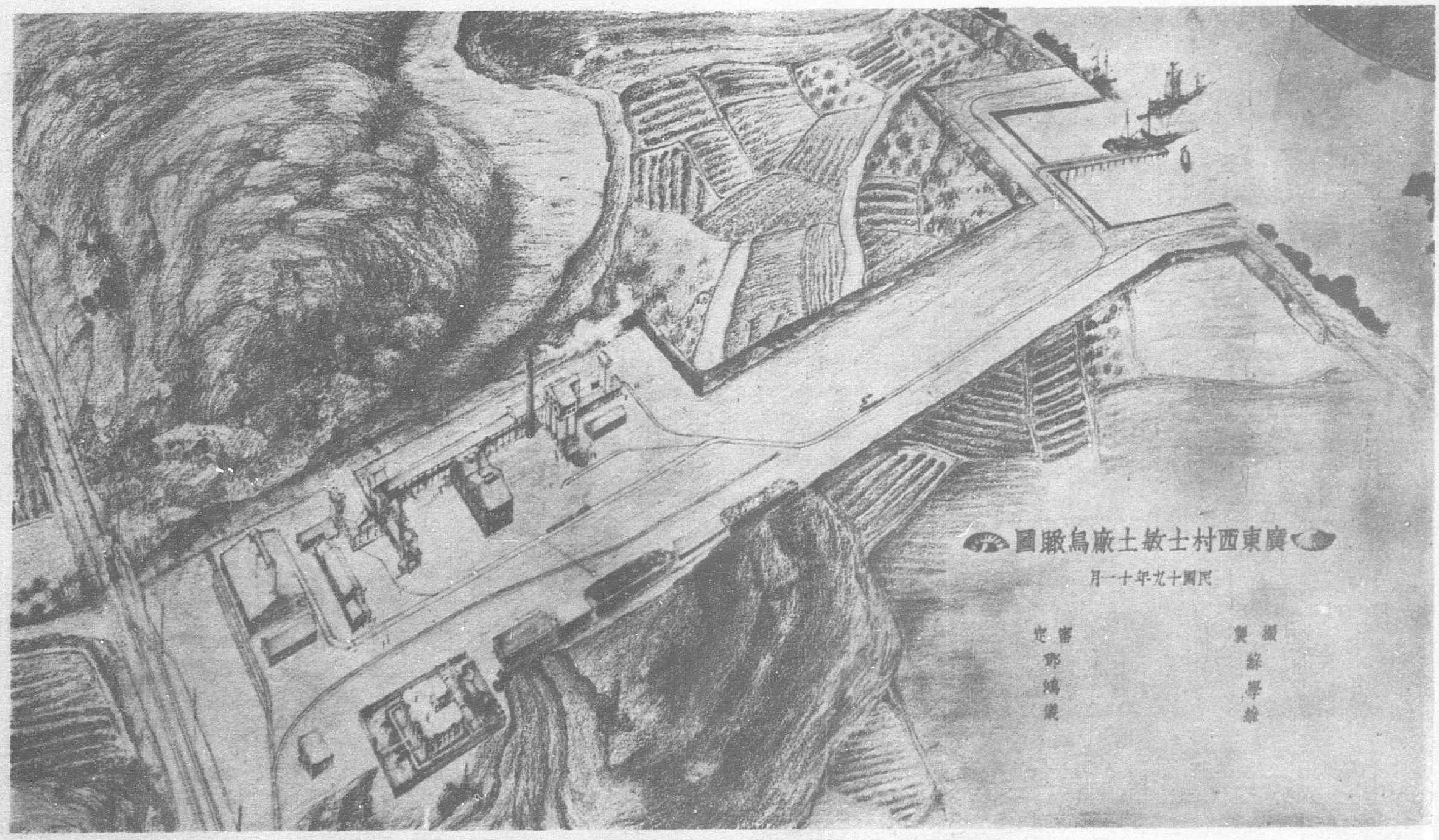


Group of Chinese Officials Headed by General Chang Min-chu at the Ceremonies Attending the Laying of the Corner Stone of the Kwangtung Cement Works

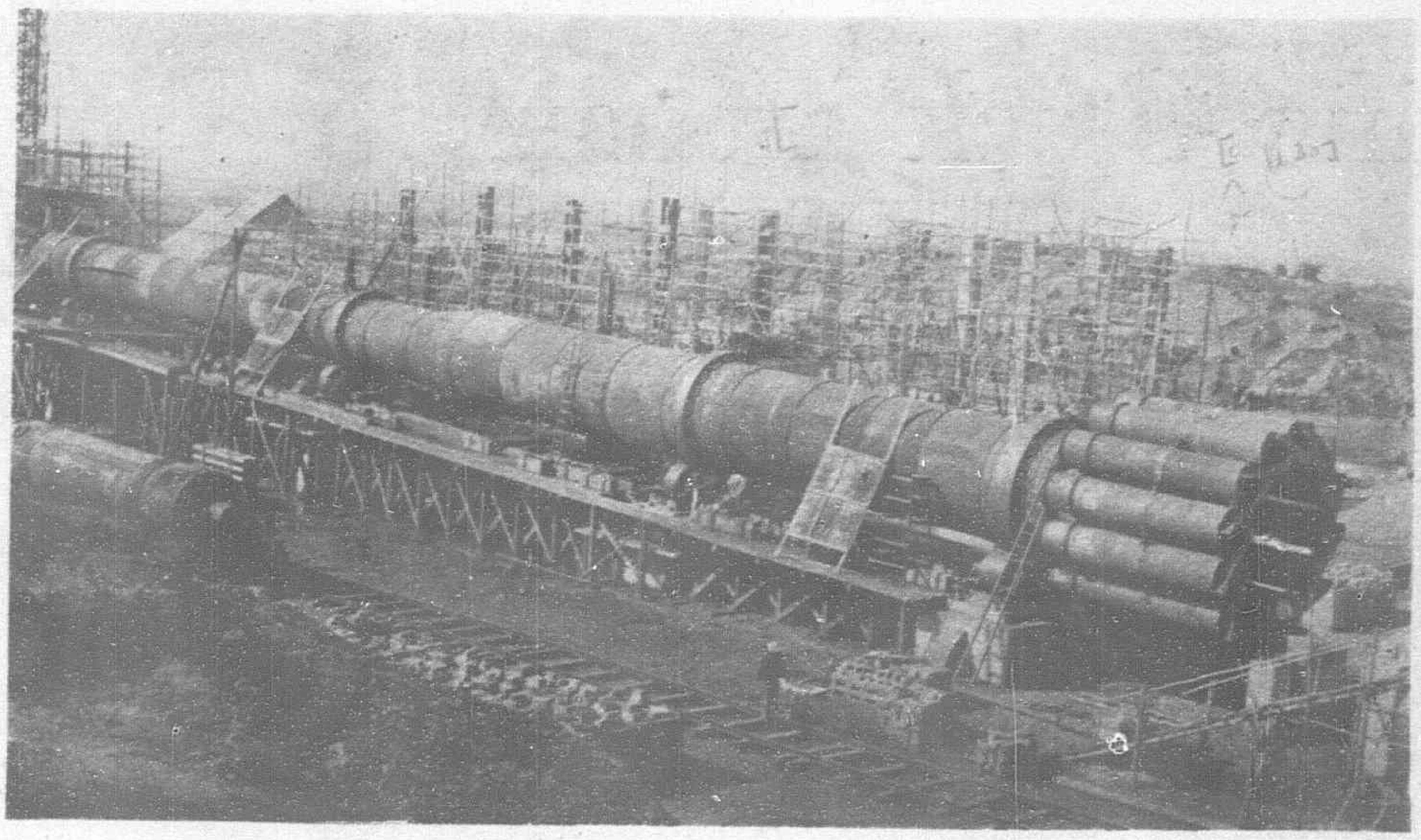
The Kwangtung Cement Factory

On December 15, the corner stone of the big Kwangtung Government Cement Plant was laid with appropriate ceremonies in the presence of General Chang Ming-chu, (Chairman of the Provincial Yuan). Mr. Tang Ying-wen, (Commissioner of Reconstruction) and other high government officials. Over 500 invited guests attended the celebration. The following official description of the enterprises handed to each guest is translated from the Chinese :—

In the beginning of 1928, the Ministry of Railways sent a representative to arrange with the Kwangtung government, to build a modern cement factory, in order to meet the demand for the construction of Canton-Hankow Railway. As a result of this conference, Construction Commissioner, Mah Tsao-chin, was instructed by the Provincial Authorities to raise the funds and complete the factory in 22 months. The estimate of cost, amounting to Hongkong $1,935,420, was approved by the Kwangtung Government and the Central Bank in Canton invited to advance the amount to be repaid by the Bureau of Finance by monthly instalments of $100,000 each. It was decided that the plant, having a capacity of producing 1,200 barrels daily, should be bought from F. L. Smidth & Company of Copenhagen, Denmark. The agreement, signed in March 1929, provided that the machinery was to be paid for in monthly instalments. In May of the same year, Wang Tsao-chang, was appointed to take charge of the


廣東西村士敏土廠鳥瞰圖
民國十九年十一月
繪製
審定

General View of Kwangtung Government Cement Factory preparatory office. The estimate of $1,935,420 was apportioned as follows:—$960,000 for machinery, $70,020 for administrative expenses, $14,000 for travelling and inspection expenses, purchase of factory site, $5,000, construction expense, $320,400. The purchase of factory site at Ping Sze, $80,000, incidental expenses, $76,000, transportation expenses in Hongkong, $30,000, installation expenses $130,000, construction of godowns, $50,000, running expenses, $200,000.



First Stage of Kwangtung Cement Plant, December 30, 1930

At first the cement factory was considered as a public industrial enterprise and was therefore exempted from paying import duty on its machinery, so duty was not included in the estimate. Afterwards, however, the Ministry of Finance ordered that, with the exception of all military supplies, all commodities must pay duty, and $190,000 was set aside by the provincial authorities for this charge.

The Factory Site

The site of the factory as originally planned was to be at In-Tuck-Pah-Shah-Chu, but as this was found unsuitable, it was changed to a location at Sze Dau Kong, near Shitsun, with the river in front and the Canton-Hankow Railway at the back, providing transportation facilities either by land or water with Canton. The factory site cover more than 120 mow of land.

Construction.—In the autumn of 1929, after Commissioner Tung assumed charge of the work and he appointed Tung Hoong Nyi to supervise the construction, and the installation of machinery. If nothing extraordinary happens, by next summer the whole plant will be installed.

Some of the Important Details of the Cement Factory

(1) To adopt "Wet" Process.

(2) Electric Power to be used: Capacity: 1,500 kilowatts.

(3) All machinery ordered from F. L. Smidth & Co., Copenhagen.

(4) Length of Oven: 82 M × 3 M. Burning 200 tons of clay per day.

(5) Yearly Output: 66,000 tons or 413,400,000 barrels of cement.

(6) About 100,000 tons of lime stone used yearly.

(7) About 20,000 tons of clay used yearly.

(8) About 23,000 tons of coal used yearly.

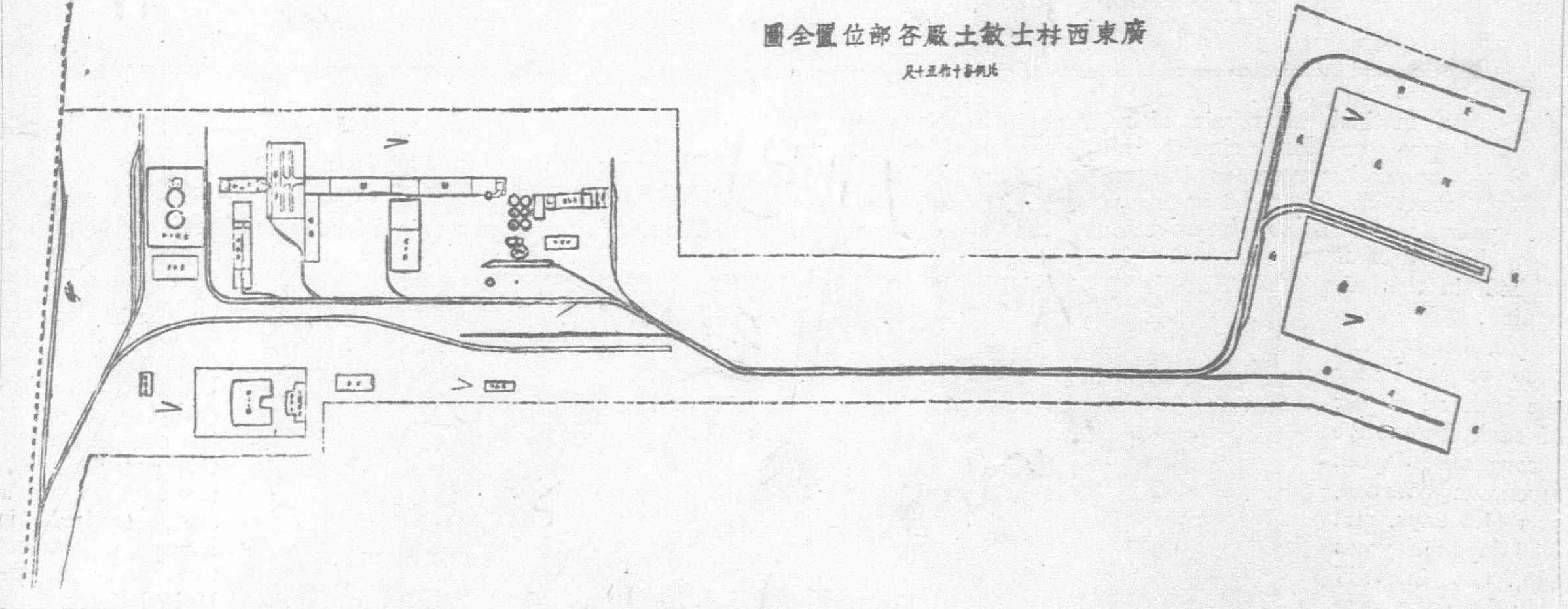
(9) About 2,000 tons of gypsum used yearly.

(10) The value of the factory, including machinery and buildings is about $3,000,000.

(11) Lime stone comes from In-Tuck Hsien (District).

(12) Clay comes from the river bed of Siao Pei-Kiang, near the factory.

(13) The factory employs direct about 600 workmen specially for transporting in the engineering room, packing, to get clay and lime stone and for other river transportation for raw materials.



Layout of Kwangtung Cement Factory

Machine and Tractor Stations in Central Asia Exceed Program

The machine and tractor stations in the cotton region in Central Asia, of which there were thirteen last year, carried out their program successfully, plowing 167,000 hectares instead of the 145,000 hectares planned. At present preparations are in progress or establishing 65 new stations there, which will have 8,000 tractors. These machine and tractor stations will till 90 per cent of the entire cotton area of Central Asia. Toward the spring of 1931, 24,000 new tractor drivers, 1,000 mechanics and 300 technicians will be required in this region, about 50 per cent of whom have already been trained from the ranks of the native population.

Rolling Stock Repair in Japanese Government Railways

General Overhaul of Locomotives in Five Days

By OKIIYE YAMASHITA, Director, Bureau of Mechanical Engineering, J. G. R.

FOREWORD:

The remarkable record made by the Japanese Government Railways in shop efficiency, reducing the time required for the general overhaul of a locomotive to under six days, has compelled the attention of the engineering world to their methods.

As a result of a world wide investigation into railway repair practice, the Soviet Government recognized the superiority of Japanese methods and requested the Japanese authorities to assist them in solving their transportation problem. Twelve Japanese engineers from the Department of Railways are now in Moscow, teaching the Russian how to organize and manage their railway repair shops. A group of Russian engineers are either in Japan or are to arrive there shortly, for a course of instruction in the Japanese railway shops.

During the summer, the Persian Government also requested the Japanese Railway authorities to send them an expert to supervize its rolling stock repair and we understand that another group of Japanese engineers are now re-organizing the Ussuri Railway (Vladivostok to Harbarovsk) and when finished will proceed with the same task on the Amur Line.

It is interesting to learn that the Chinese Ministry of Railways is also preparing to send a delegation of workshop specialists to study Japanese methods of rolling stock repair on Japanese Government Railways. Although the personnel of the group has not yet been decided upon, it is hoped to have them assembled at Nanking by April 20.

The awarding of the tender for four locomotives and one hundred cars for the Kiaochow-Tsinan Railway to Japanese manufacturers is a further indication of the progress being made by Japanese railway manufacturers in the export field. The four locomotives, it is understood will be built by the Shakako Works of the South Manchuria Railway, one of the most efficient shops in Asia, turning out all the locomotives and rolling stock for its own system and for several of the Chinese lines in Manchuria. The hundred cars will be built by the Kisha Seizo Kaisha, of Osaka, the leading rolling stock makers in Japan.

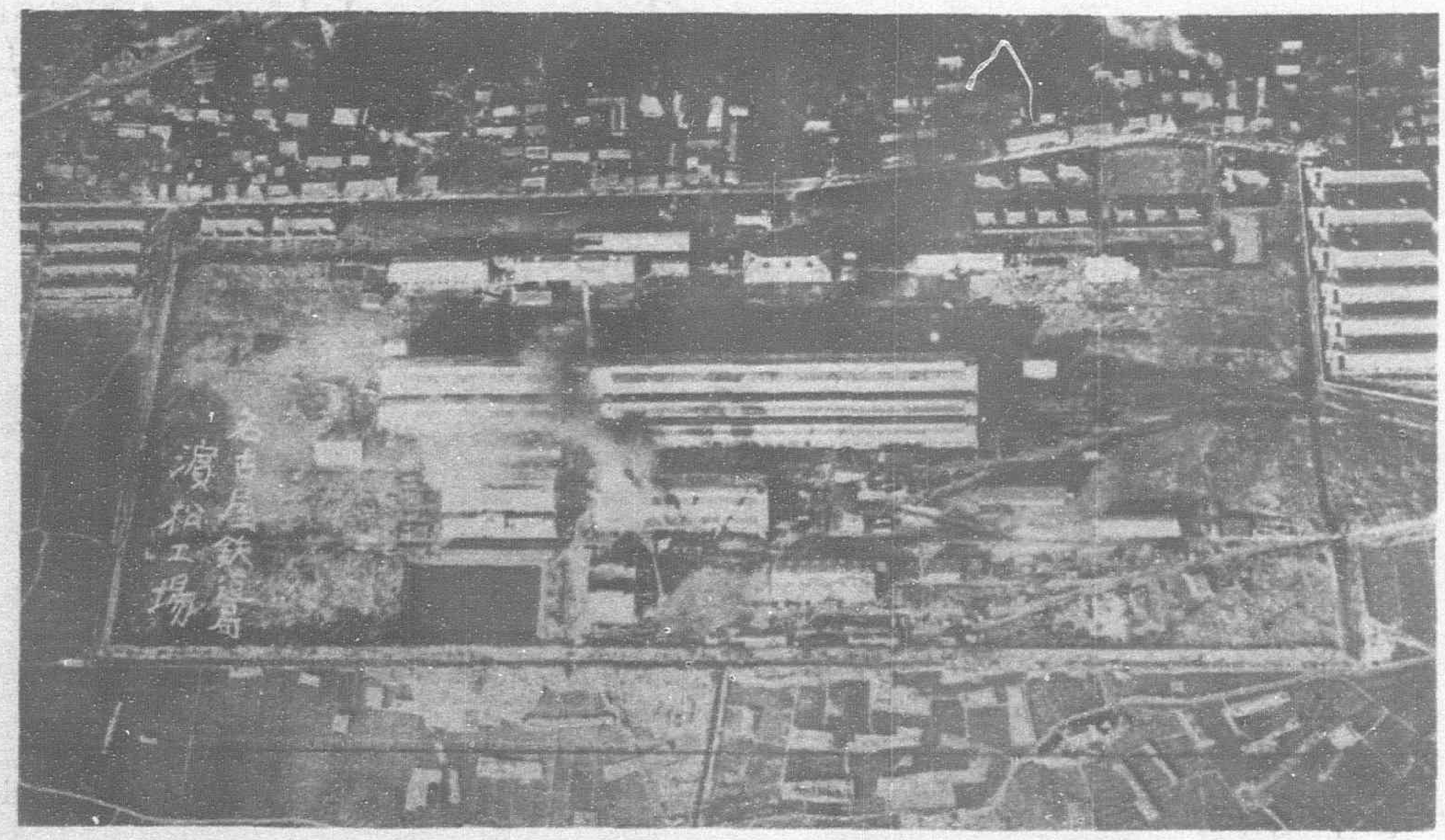
The following paper on the " Methods of Rolling Stock Repair in Japanese Government Railways " was submitted by Mr. O. Yamashita, to the World Engineering Congress last year. The paper is too long for reproduction in full, so we have extracted that part dealing with the repair of locomotives, together with 43 illustrations, showing each step of the repair work.

THE method of repair of rolling stock seems to be more or less similar all over the world. In Japan, however, as the result of very hard and constant study of shop management during the last ten years, remarkable improvement and speedy progress have been accomplished in this direction. For example, the average time required for the general repair of each locomotive throughout Japan, seventeen years ago, was 41.6 days, and 13.6 days ten years ago, but in 1927 only 6.6 days were needed for such repair work.

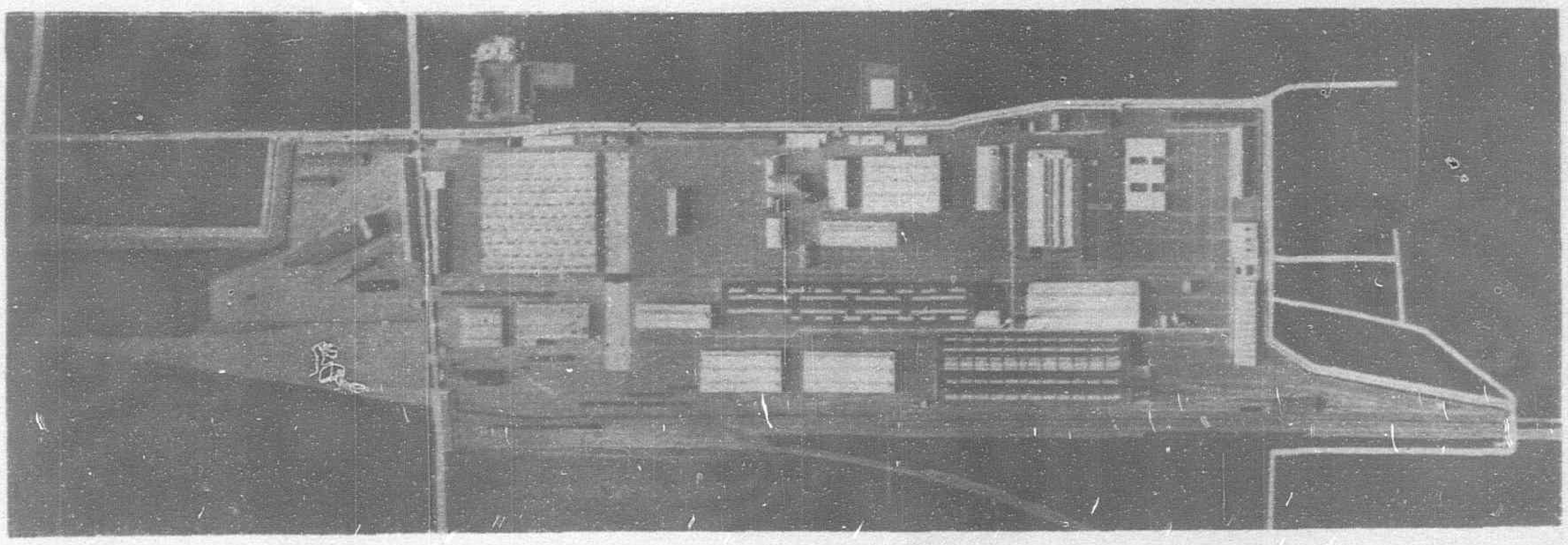
This shows wonderful progress, and the repair of passenger and freight cars exhibits a similar result, as follows:

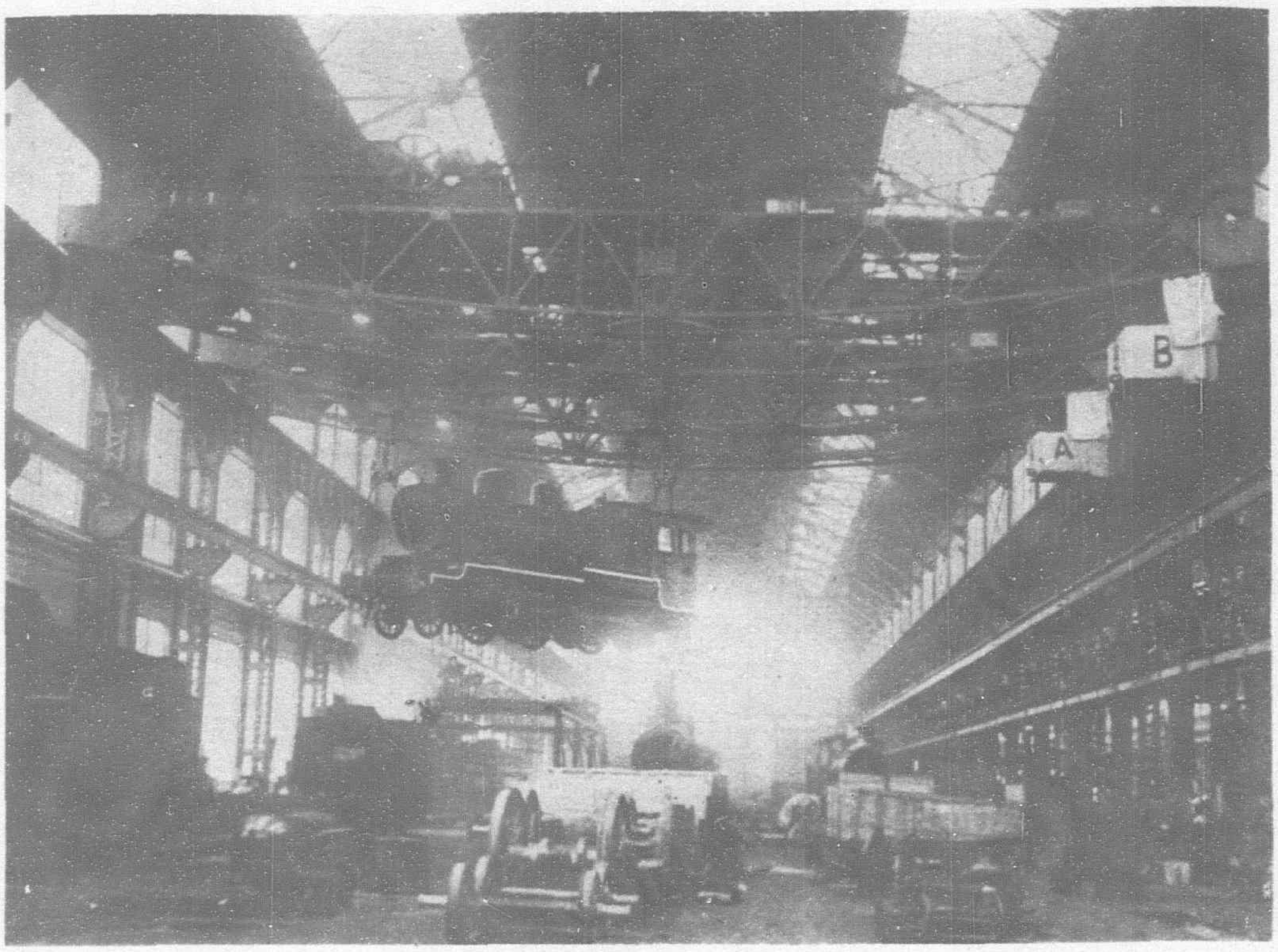
	1919	*1927*
Passenger cars	19.2 days	7.1 days
Freight cars	7 days	16.4 hrs. (0.68 days)

The number of days required for repair of rolling stock, which naturally depends upon the condition of each country, is a little more in Europe than in the United States. Generally speaking in the case of locomotive general repair, two to three weeks are required in Europe, while about two weeks in the United States. However, the time may be conspicuously reduced through the most careful and exhaustive study of the schedule, and hardly depends upon the size of the rolling stock, because more workmen can work



Aerial View of the Hamamatsu Works of the Japanese Government Railways at one time on a larger vehicle. The average weight of a locomotive in 1912 was 51.59 tons, 62.6 tons in 1919, and 74.3 tons in 1927. In the case of passengers and freight cars, a similar tendency is also seen. Therefore in practice the time required for the repair is to be decreased with the increase in weight of rolling stock.


Lay Out of the Omiya Works of the Japanese Government Railways

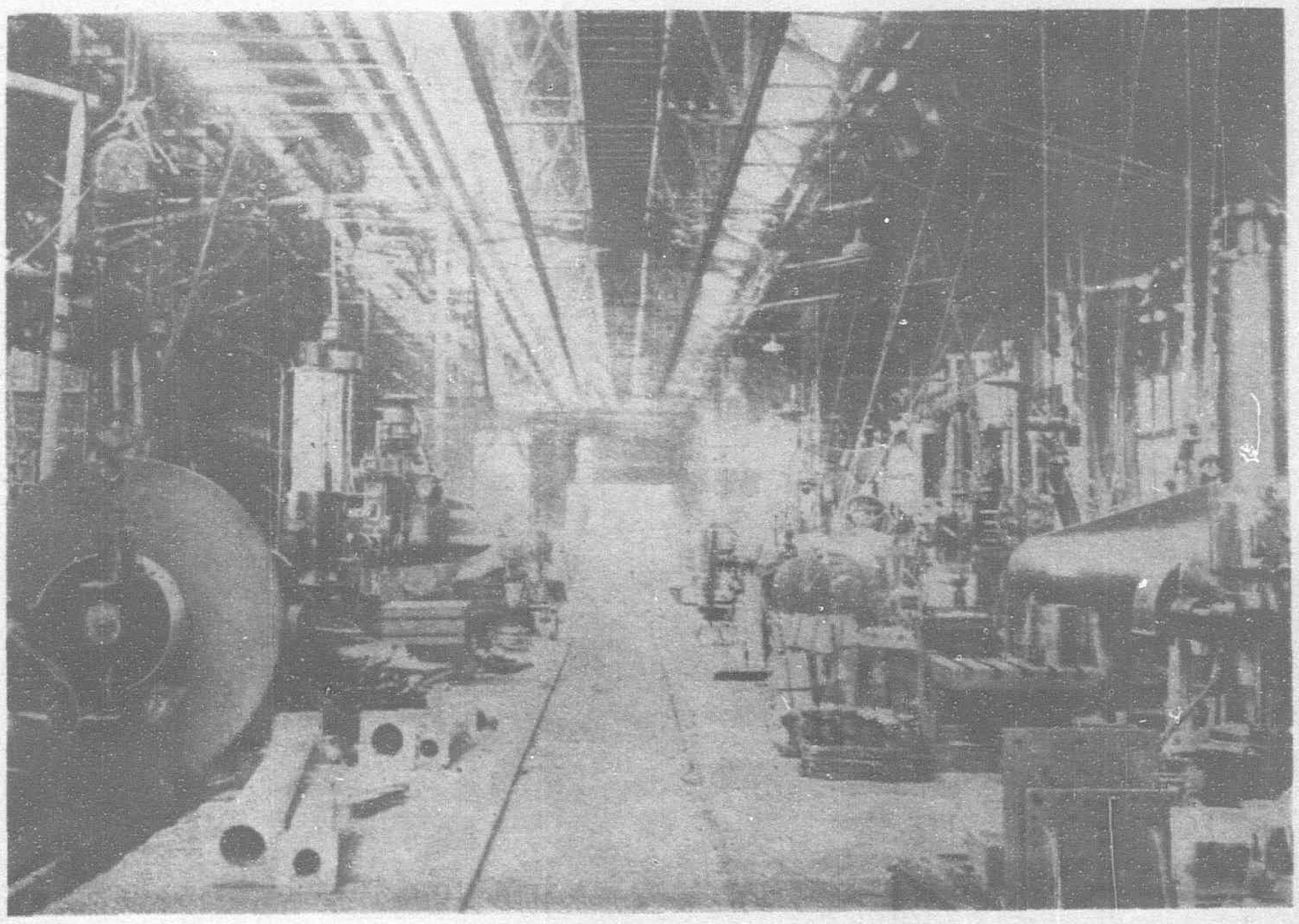


Erecting Shop of the Omiya Works

Through better shop management, not only the time spent for repair, but also the amount of man-hour labor per car can be reduced to a certain extent regardless of the increase in the size of cars. This fact, however, tells us that the reduction of the time for repairing cannot be realized by scheduling only; it must be accompanied by improved shop management, improved machinery and tools, as well as advanced repair methods.

When many workmen are engaged in one job at the same time, the most careful investigation should be carried out and consideration given to the preparation and distribution of materials, scheduling and routing, otherwise smooth progress of work with high efficiency cannot be expected.

The outstanding feature of the schedule that has ever been investigated with the greatest effort and applied to our workshop practice, is the parallel working of each step of work, which has effected a wonderful saving of time in executing repairs, as already mentioned.


Lathe Shop of the O-i Works

Parallel working in general is fully explained in Chapter III with a chart which will present a clear idea of it. However, a few remarks on the limit gauge as an example of our care and thought even about a trivial matter of work, will here be given. Taking the pin or bush of the valve motion as an example, the specified wear limit is divided into certain numbers, each of which has its specified tolerance. So, if the number of wearing grade is mentioned, which probably can be measured when it is inspected, both pin and bush can be repaired at the same time, *i.e.*, in parallel, instead of repairing one after the other as used to be our practice. Thus a reduction of the time required for repair can be secured.

Besides these points it is also important that the whole works act in full tension as a well managed and co-operative organization, in order to improve workmanship as well as to reduce as far as possible the time required. So it will not be an exaggeration to say that whether the management is efficient or not may be measured by the decrease or increase of the time spent in effecting repairs.

Why should we concentrate efforts on the minimization of the time required for repairs? Simply in order to promote the efficiency of transportation. In other words, more transportation with less rolling stock. This can mostly be done by reducing the time taken for repairs, which means cutting down the number of vehicles out of service. In this connection, reducing the time taken for repairs must be one of the most important factors, both economically and technically.

Regarding railway shop management, there are, of course, other important factors to be taken into consideration to secure the most economical and efficient execution of repairs, such as the piece work system, utilization of reclaiming materials, etc., which have been most carefully studied in the Government Railways.

However, the purpose of this paper is only to describe the method and procedure of rolling stock repair, which have achieved such satisfactory results, especially in regard to the time required for repairs.

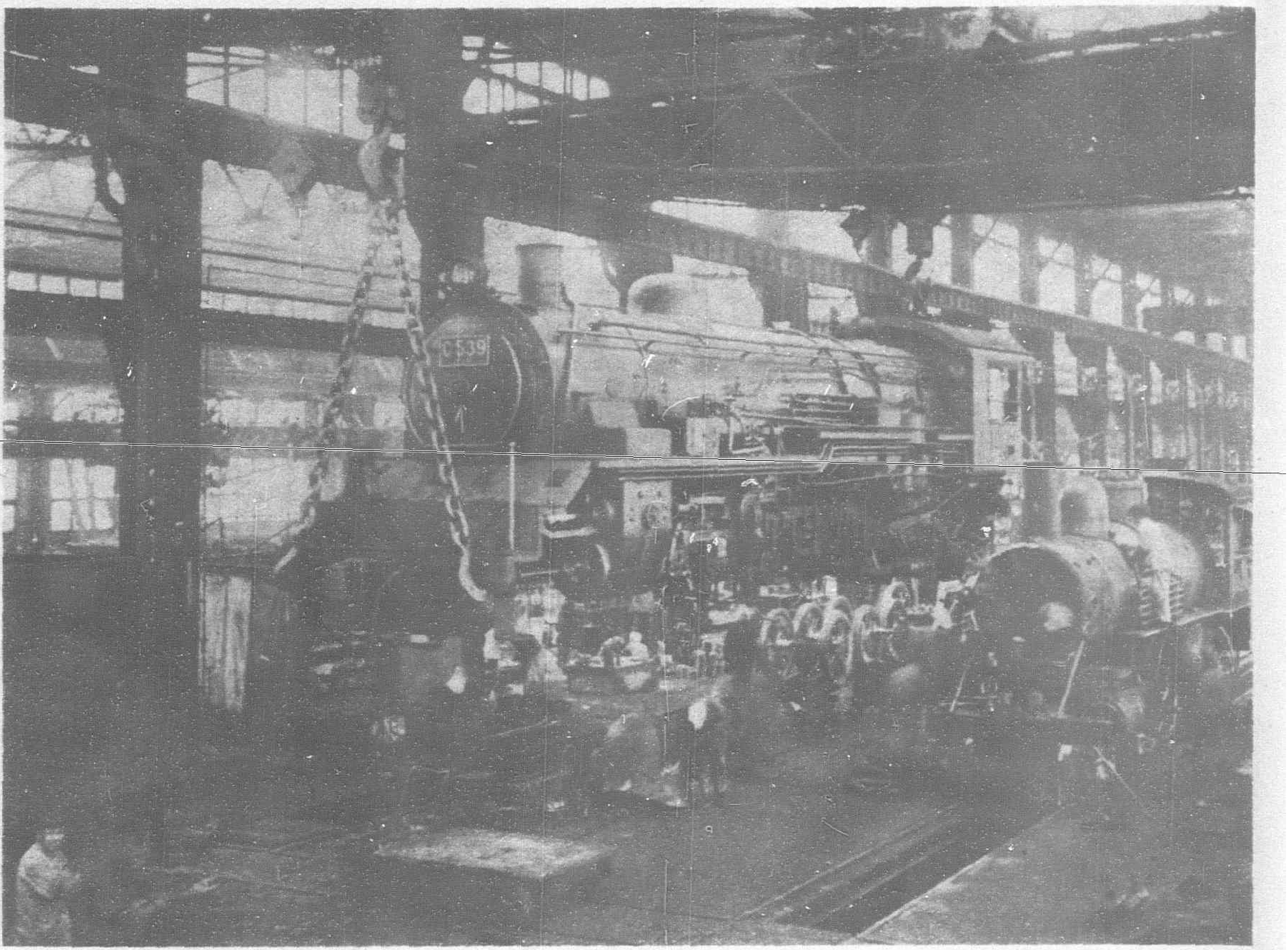
Repair Works and the Territories they Serve

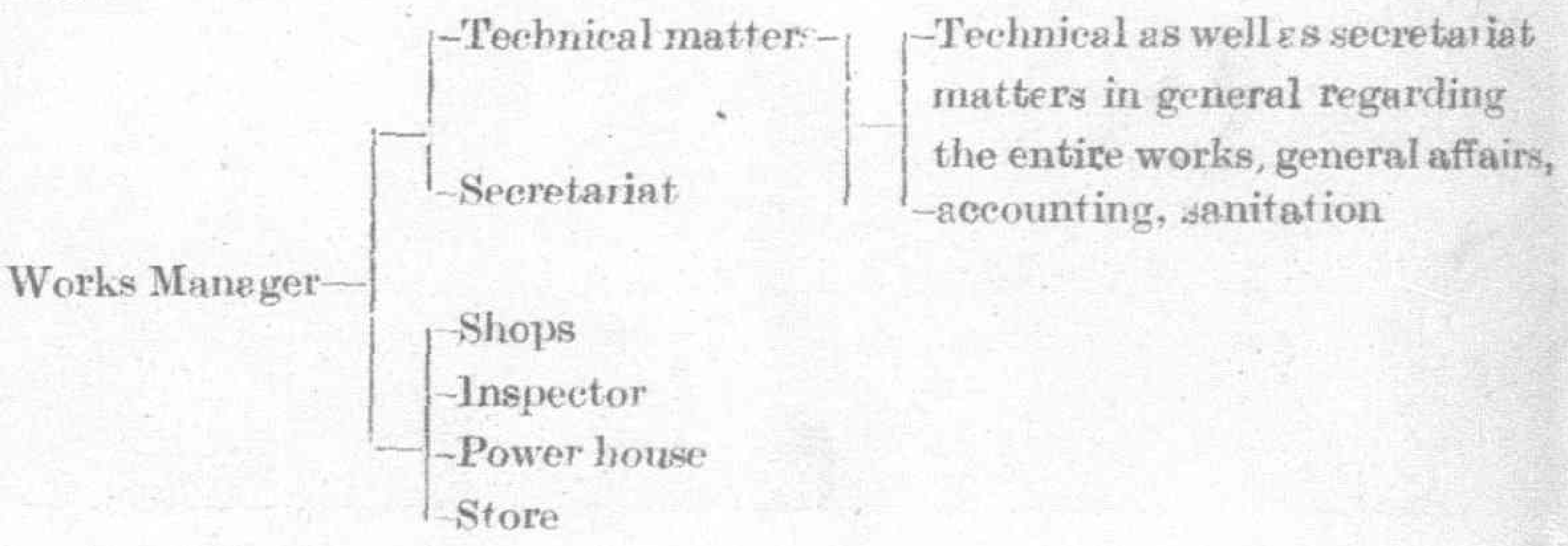
It will be better to give a brief explanation about the repair works and their territories, before the method of the rolling stock repair is discussed.

For the repair of rolling stock there are 21 repair works and five branches throughout Japan, excluding Karafuto, Chosen and Taiwan. These works are so located that each of the six local regions has a certain number of works under its jurisdiction. However, with a view to securing the most convenient and smooth movement and operation of rolling stock, the repair territory served by a works is determined independently of the territory of the local region to which the works belong. Each works takes the responsibility of the repair of locomotives and passenger cars located within the area of its repair territory. Regarding freight cars, the repair territory is also specified. However, as most of the freight cars are common throughout the country, the number to be repaired during the coming year is estimated and assigned to each works according to its capacity. The following list shows the number of works and branches classified according to the kind of rolling stock to be repaired.

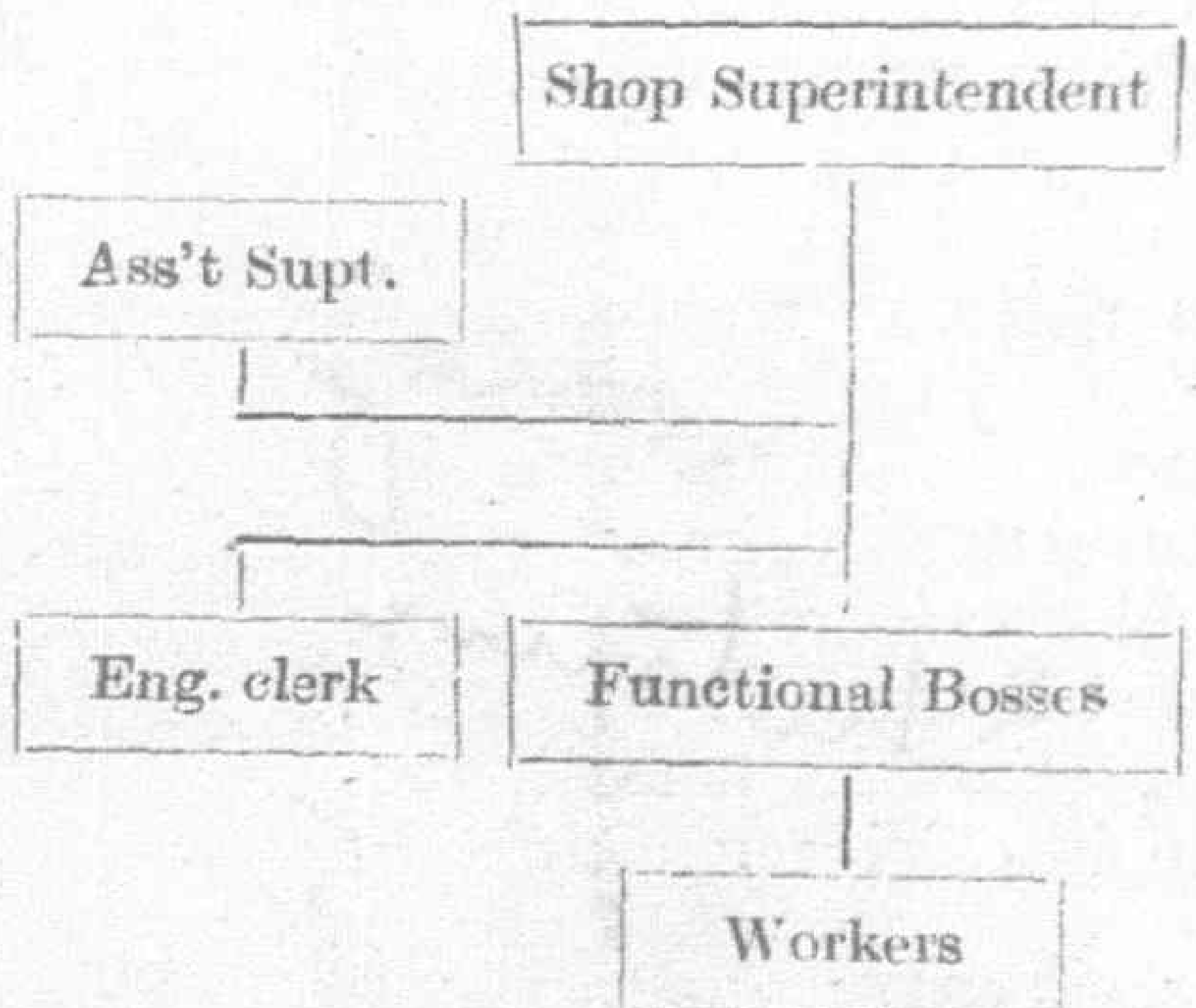
Kind of rolling stock to be repaired	*Number of Works*	*Number of Branches*
Locomotives (both steam and electric), Passenger cars (excluding electric cars), Freight cars	1	–
Locomotives (steam only)	8	1
Passenger cars (excluding electric cars), Freight cars	–	–
Locomotives (steam only)	2	–
Passenger cars (including electric cars), Freight cars	1	–
Passenger cars (excluding electric cars), Freight cars	8	4
Freight cars (coal cars only)	1	–
Total	21	5

The organization of the different works varies somewhat according to capacity and the kind of rolling stock to be repaired there. However, the following shows the general organization :—


Erecting Shop; Hamamatsu Works


Works Manager
Technical matter
Secretariat
Technical as well as secretariat matters in general regarding the entire works, general affairs, accounting, sanitation
Shops
Inspector
Power house
Store

As shown above, there are a certain number of shops in a works, and the organization of each shop which does the actual repairs is as follows :



The shop superintendent manages and supervises all the matters in the shop under his jurisdiction. The assistant superintendent helps the superintendent and sometimes acts as an acting superintendent when the superintendent is absent. The functional boss takes charge of matters under his jurisdiction. The engineering clerk, under the superintendent's supervision, studies and investigates matters relating to the shop and drafts the periodical report.

Method of Repair of Rolling Stock

The method of repair of rolling stock in our Government Railways is more or less similar throughout the country, and the following paragraphs will describe the repair methods practised in the Omiya Works as being typical:

Section 1. Repair of Locomotives

1) *Classification of Repairs.*

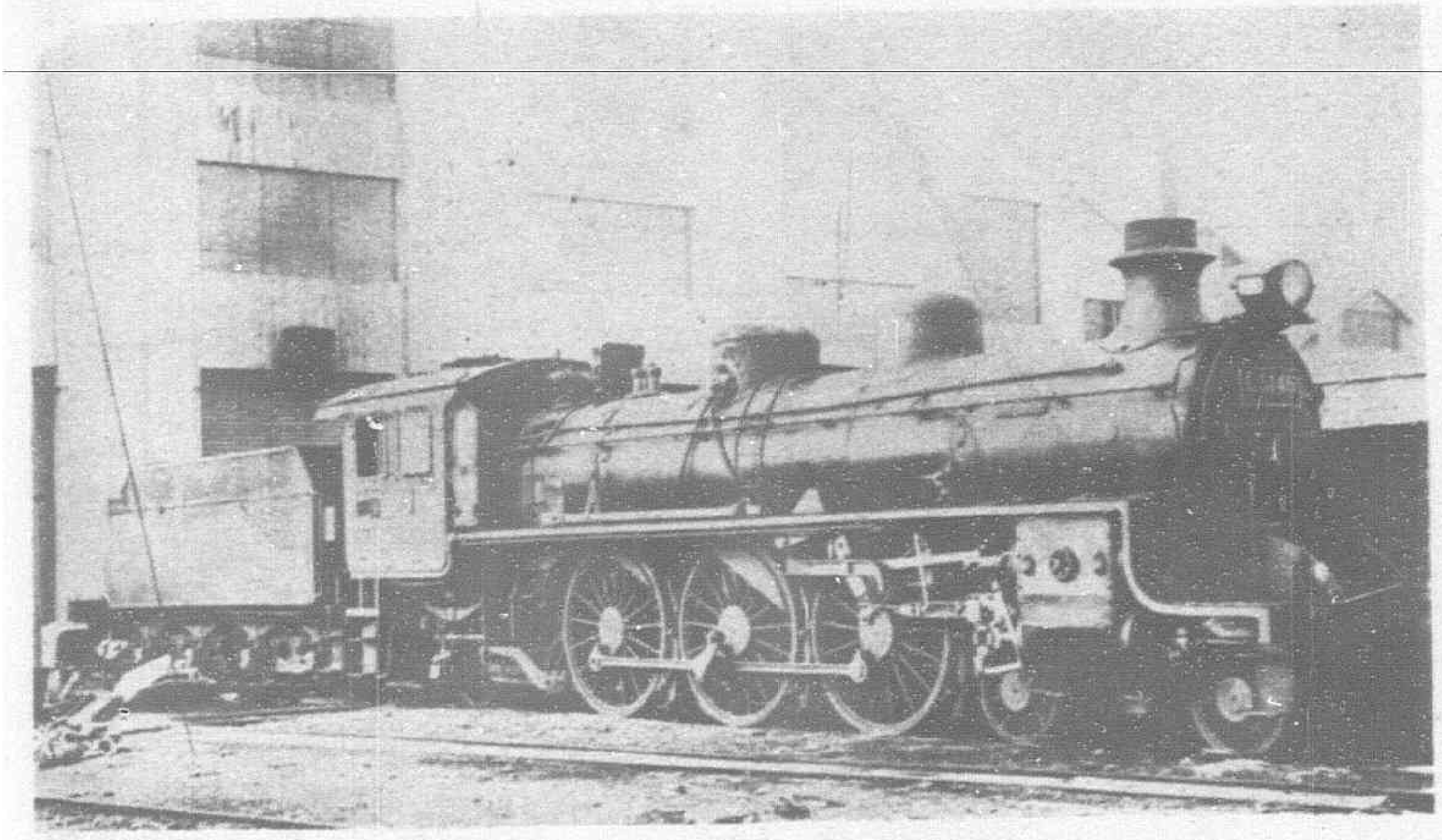
Repair of locomotives is divided into two categories, namely, general and light repairs.

a. General Repairs. General repairs are such as necessitate stripping, and take place once every two and a half to three years, depending upon the condition of locomotive. The mileage covered by a locomotive between repairs depends on both the type of the locomotive and the character of the service. However, the average is as follows:

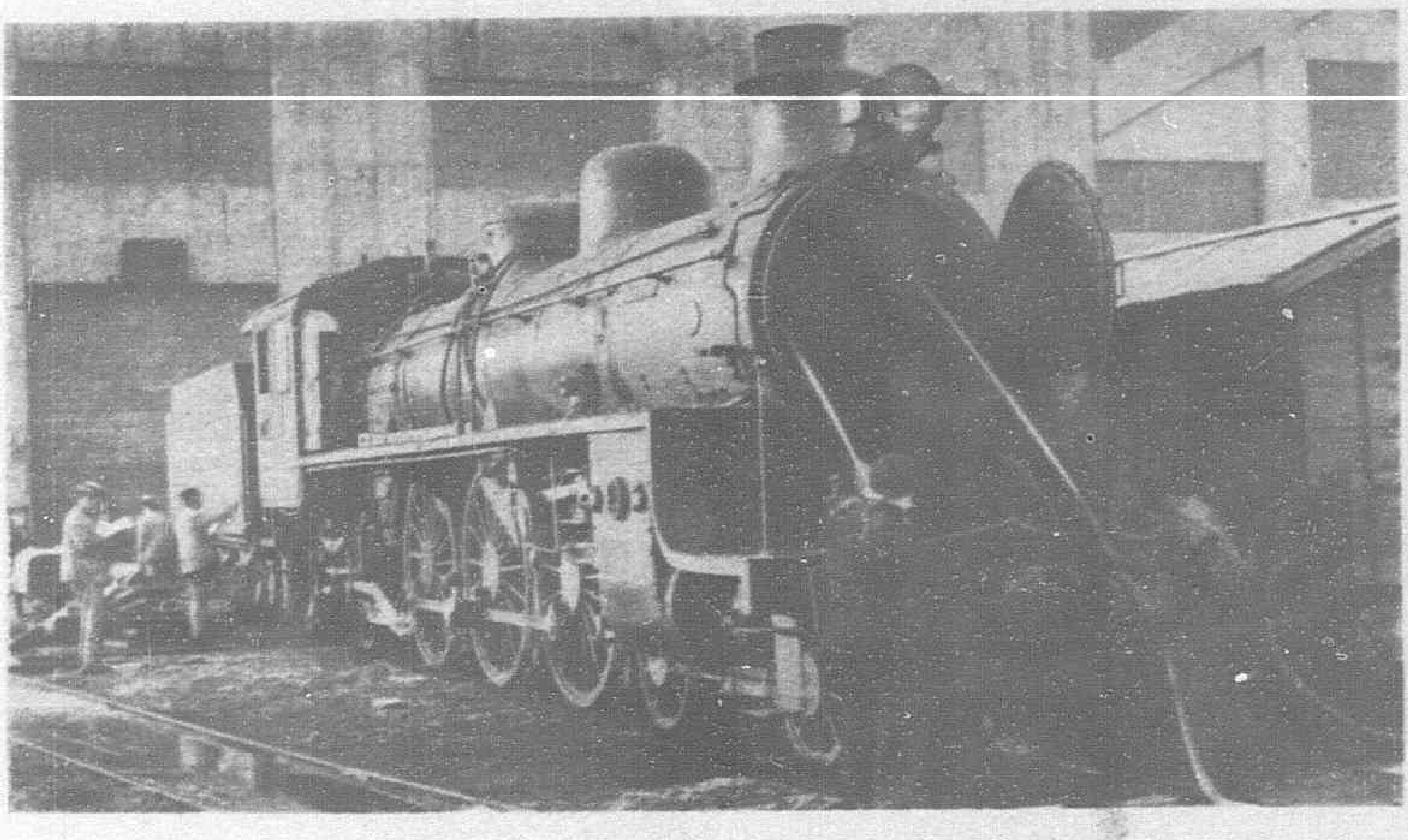
Type of locomotive	*Mileage covered between repairs on an average*	*Service*
C. 51 (4-6-2)	150,000	Passenger
9600 (2-8-0)	70,000	Freight
8620 (2-6-0)	100,000	Passenger

b. Light Repairs. Light repairs are those other than general repairs.

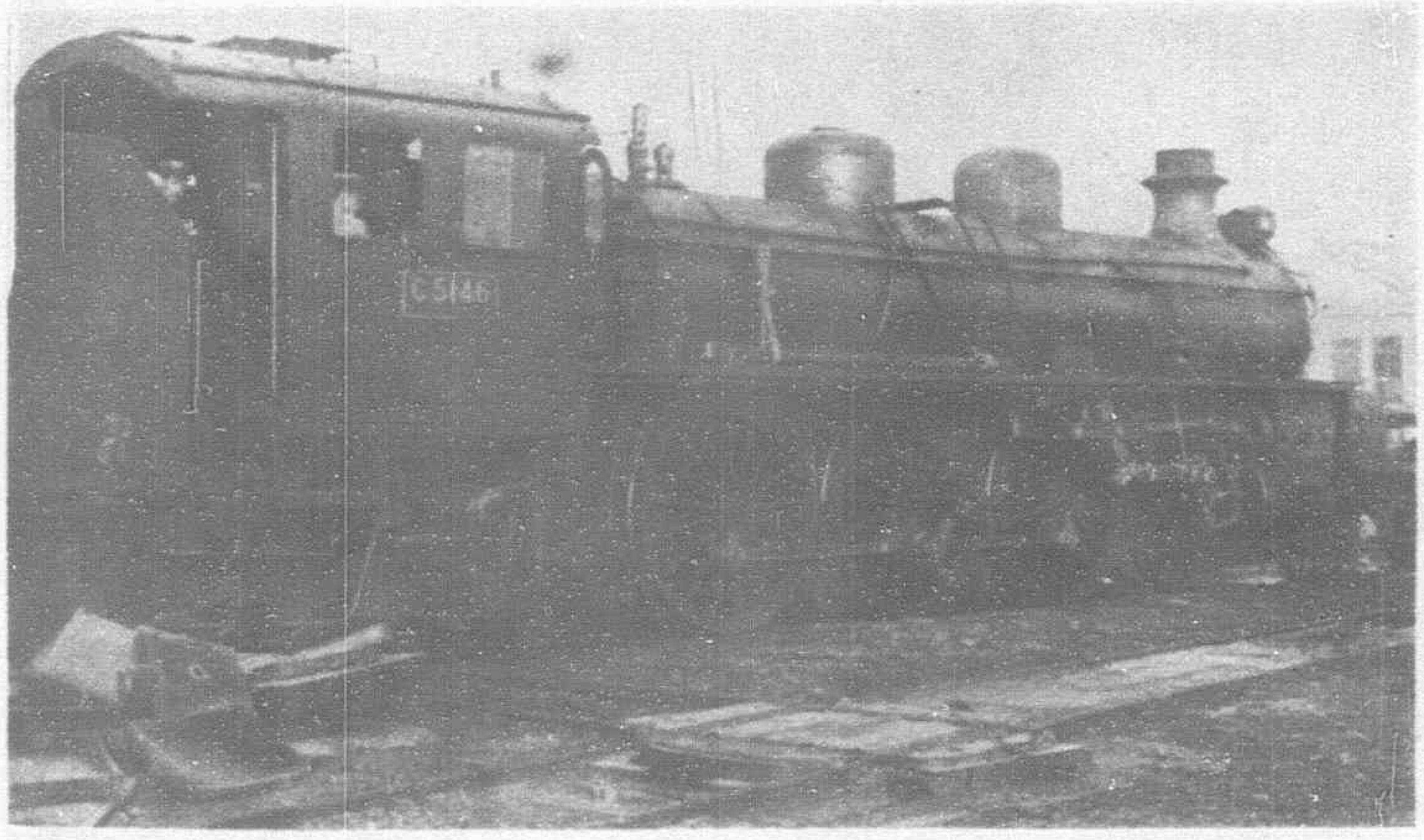
Locomotives will be sent to the works for this purpose at any time, if they get some kind of trouble (for instance, re-turning of wheels) which is beyond the repair capacity of the roundhouse.



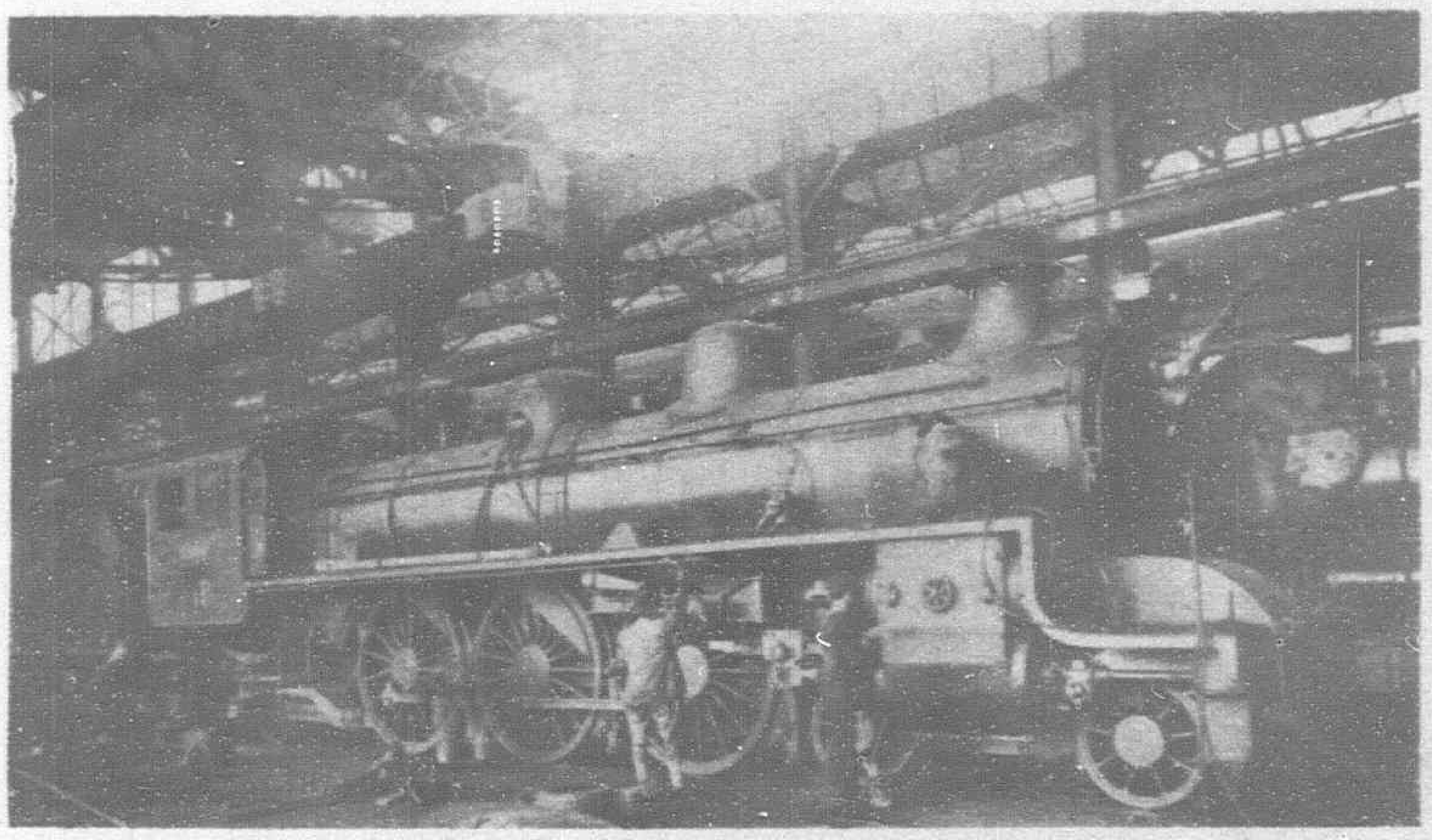
The First Day; 6.40 a.m. The Locomotive Arrived at the Front of the Erecting Shop



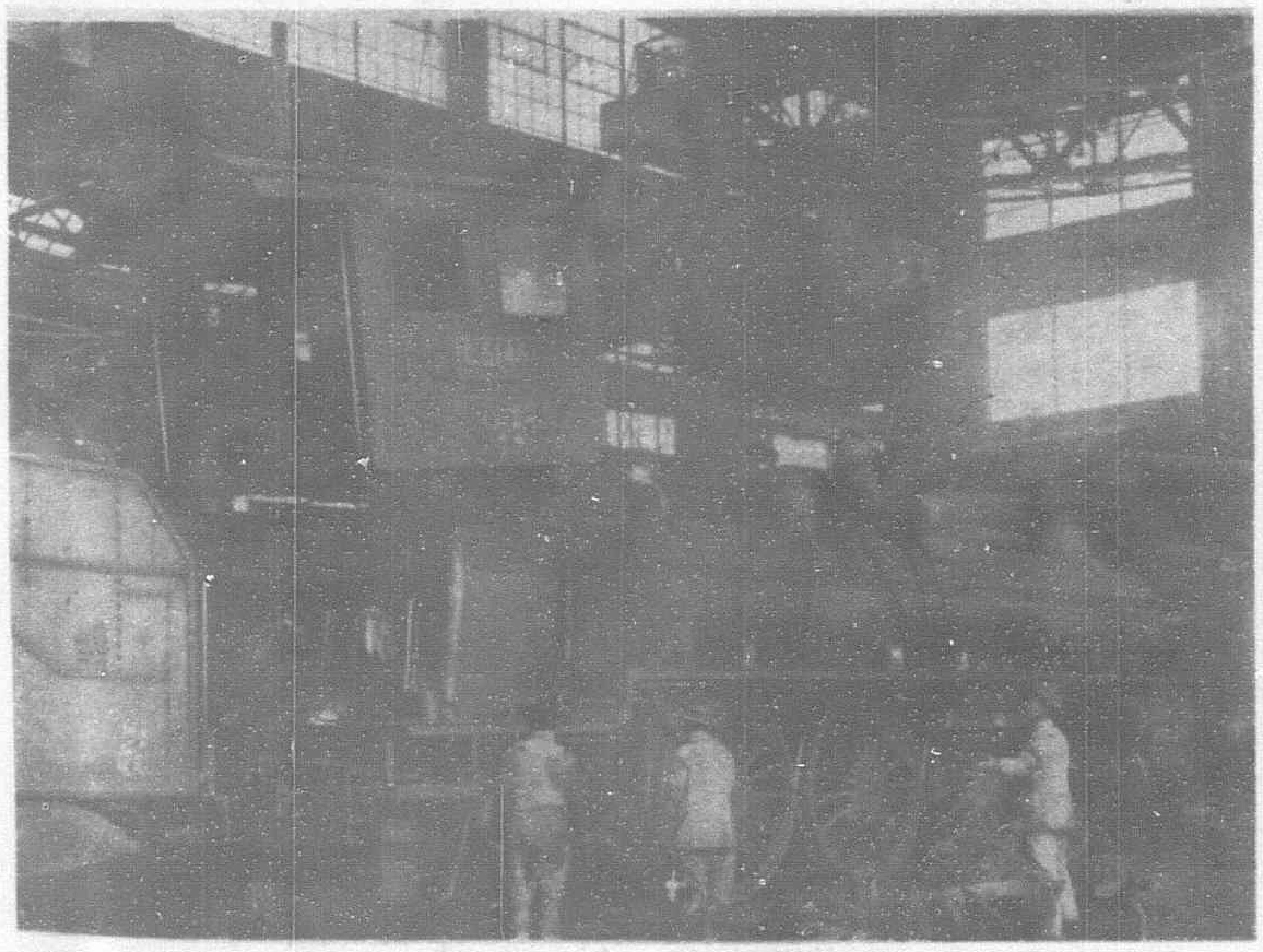
The First Day; 6.45 a.m. Washing the Smoke Box with Water Jet



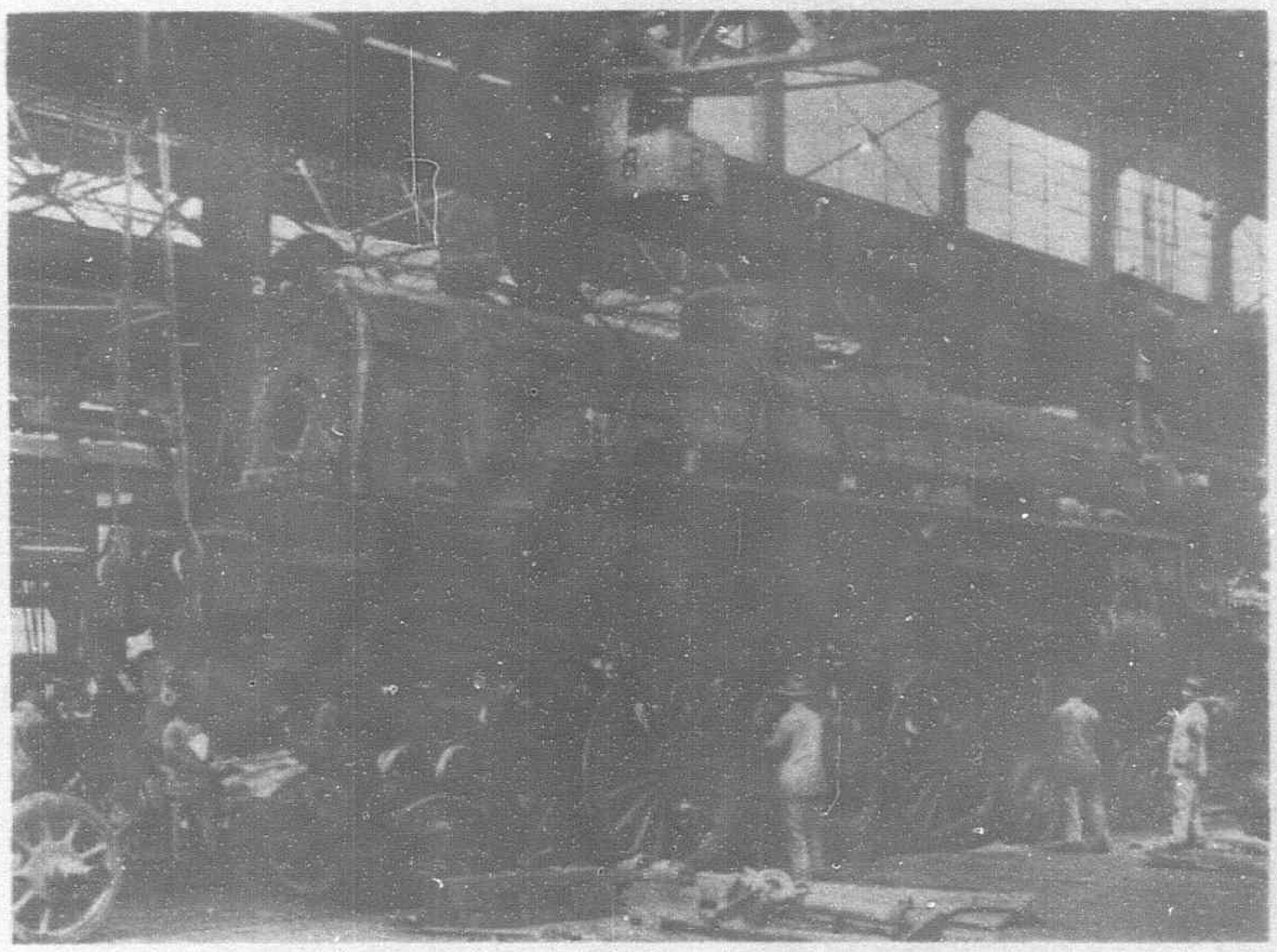
The First Day; 6.45 a.m. Washing the Fire Box with Water Jet



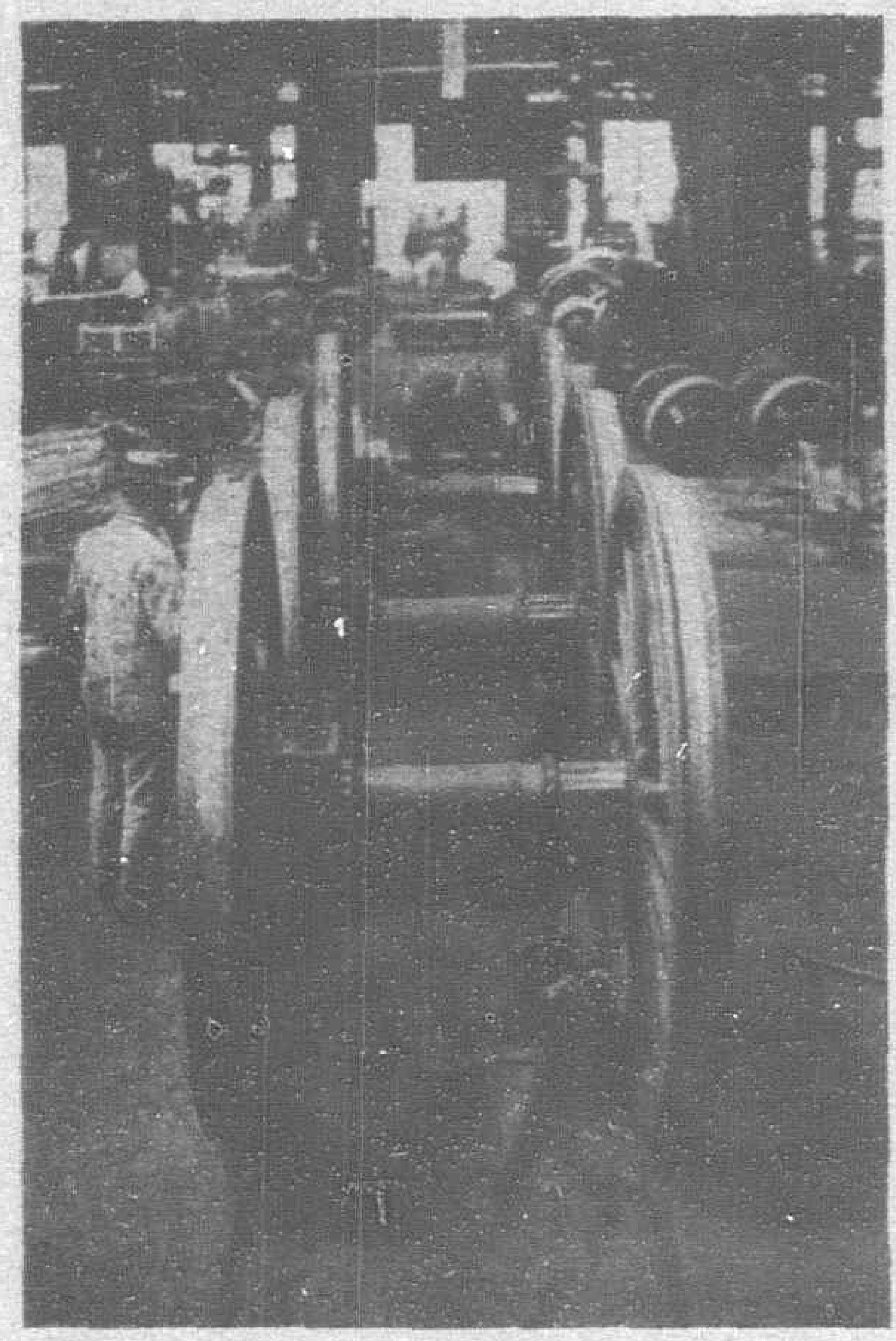
The First Day; 7.30 a.m. Beginning of Stripping on the Stripping Track



The First Day; 9.10 a.m. Removing the Cab

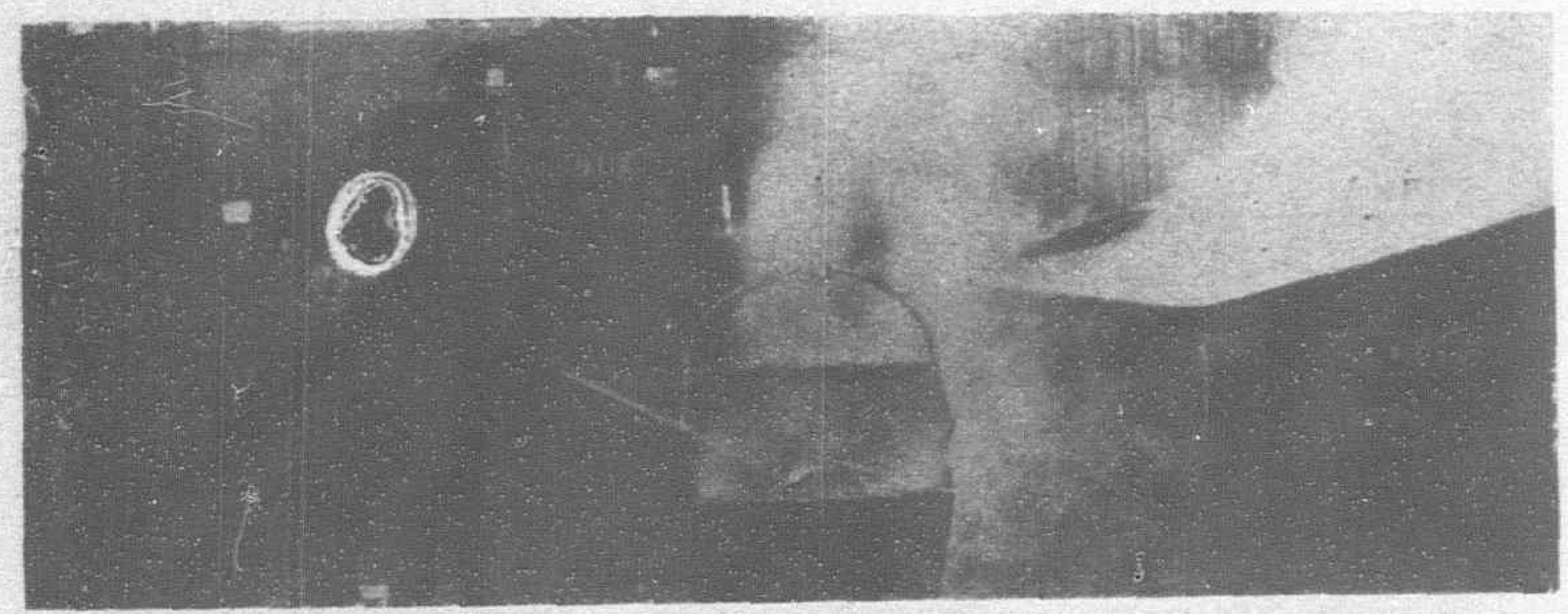


The First Day; 10.00 a.m. Removing the Wheels

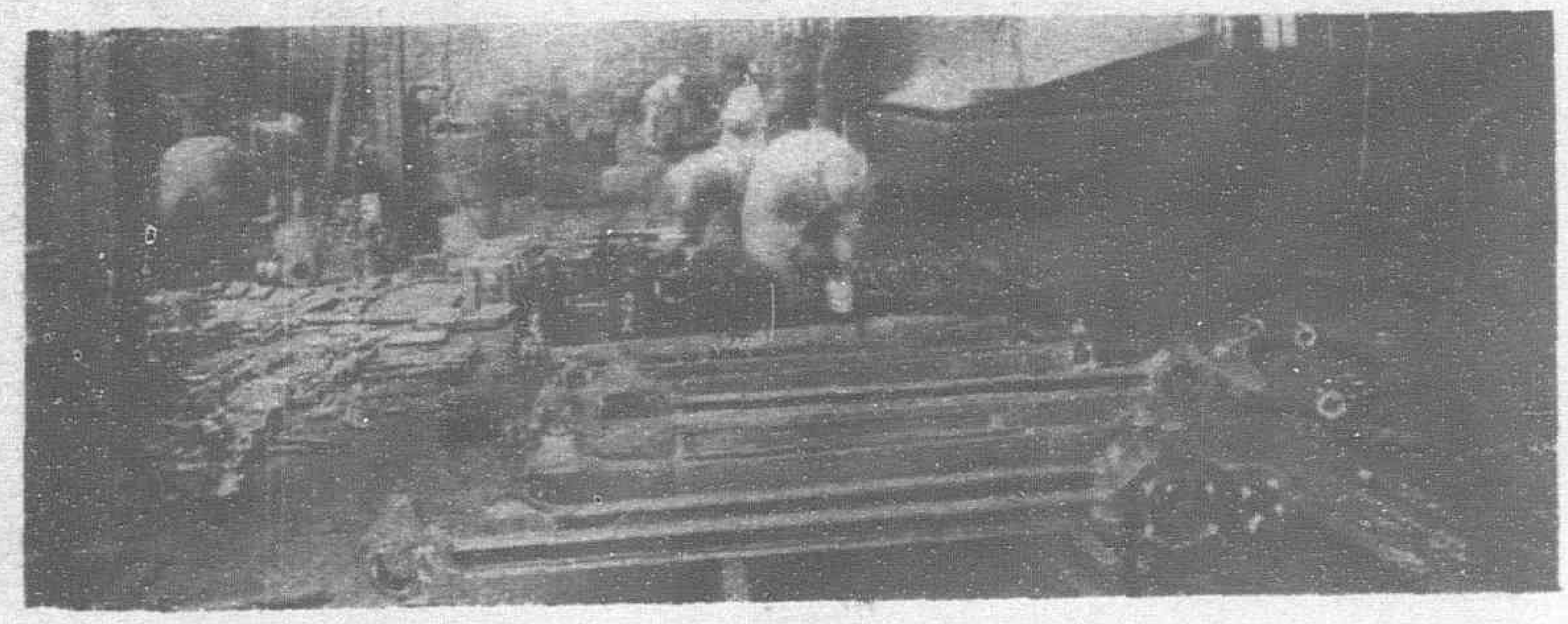


The First Day; 10.20 a.m. Dismounting of the Axle Boxes and Springs from the Removed Wheels

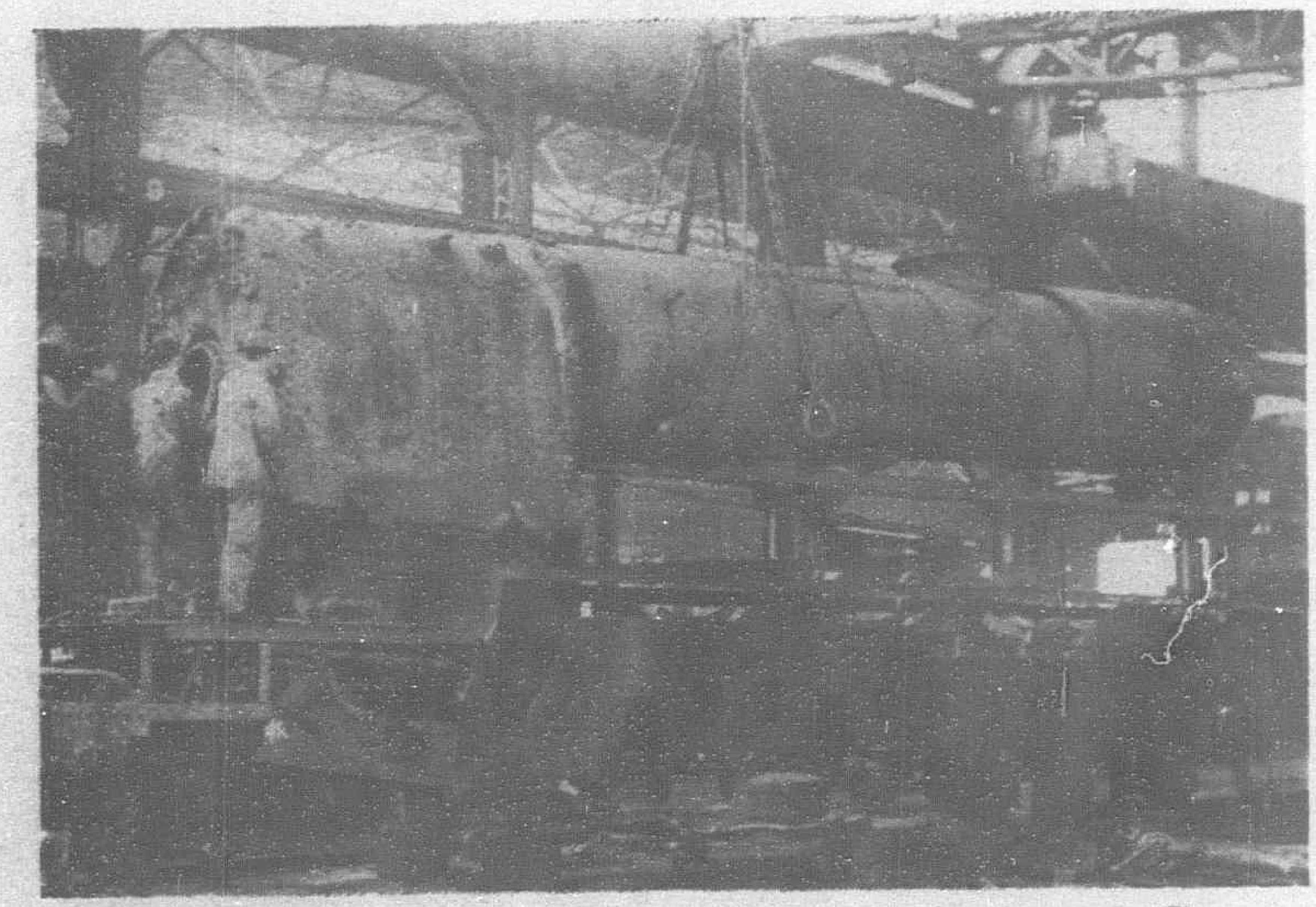
The First Day; 10.30 a.m. Putting the Greasy Parts in the Soda Bath



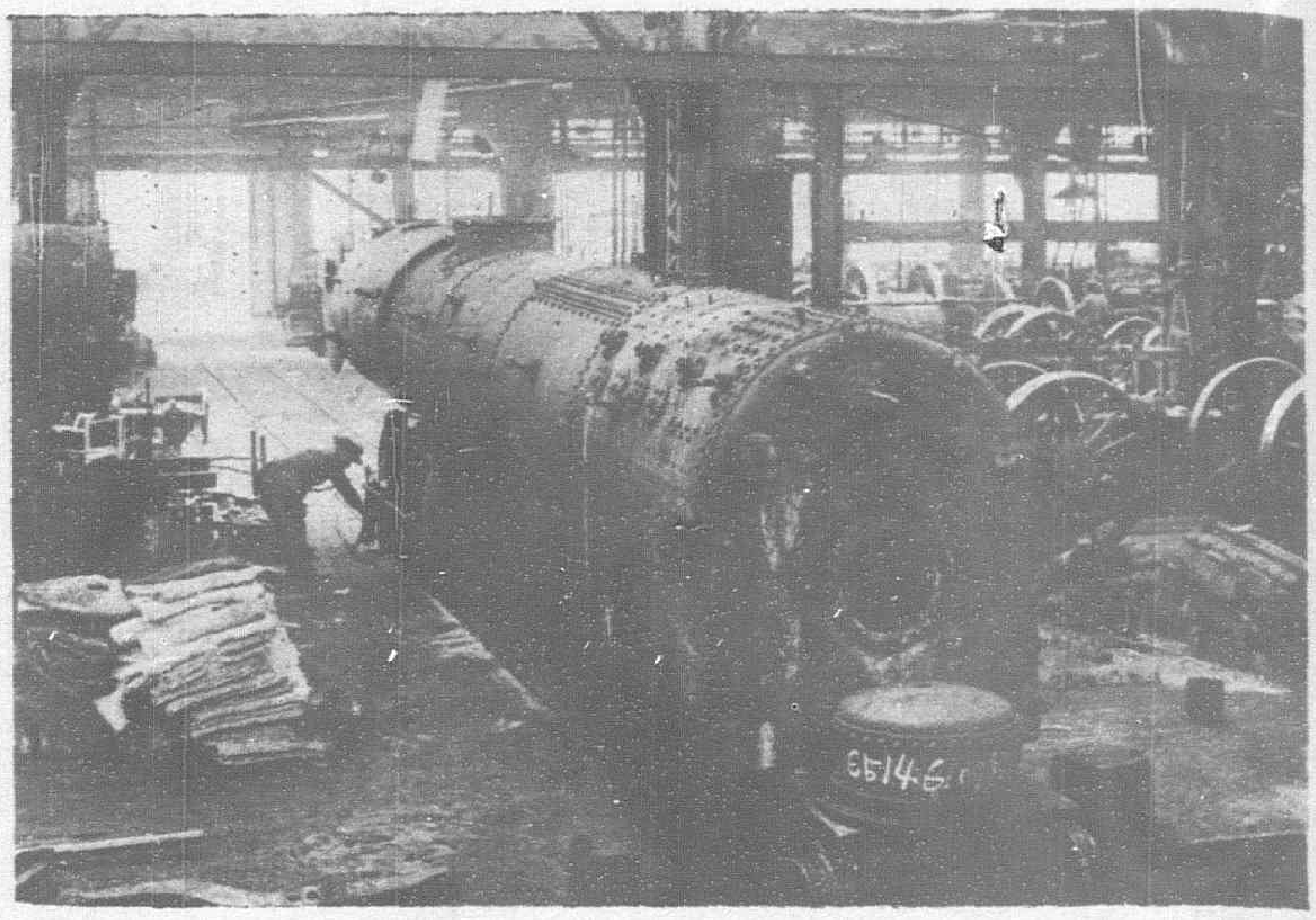
The First Day; 11.00 a.m. Washing the Parts Just Taken Out of the Soda Bath



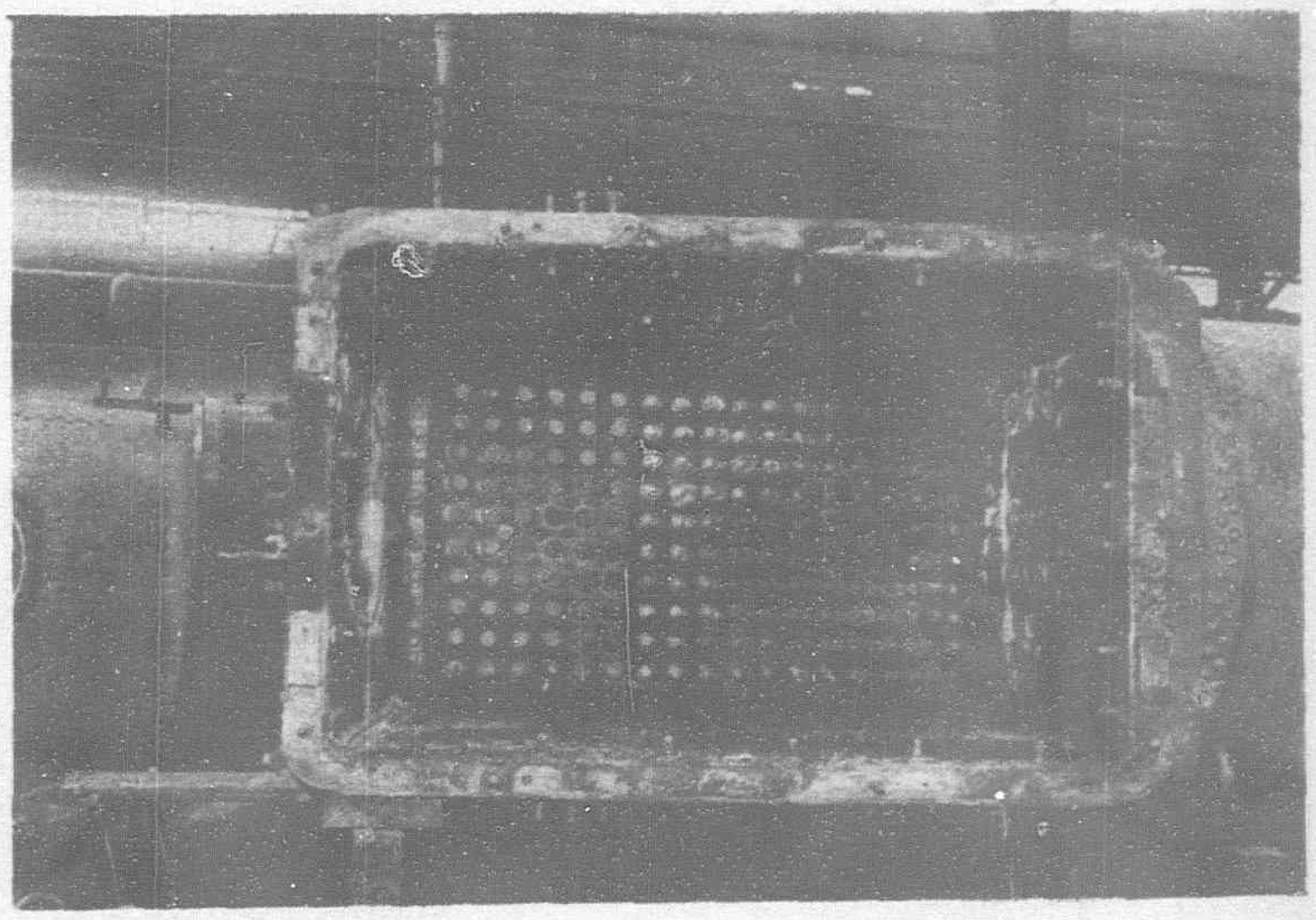
The First Day; 12.45 p.m. Inspecting the Washed Articles at the Inspection Section



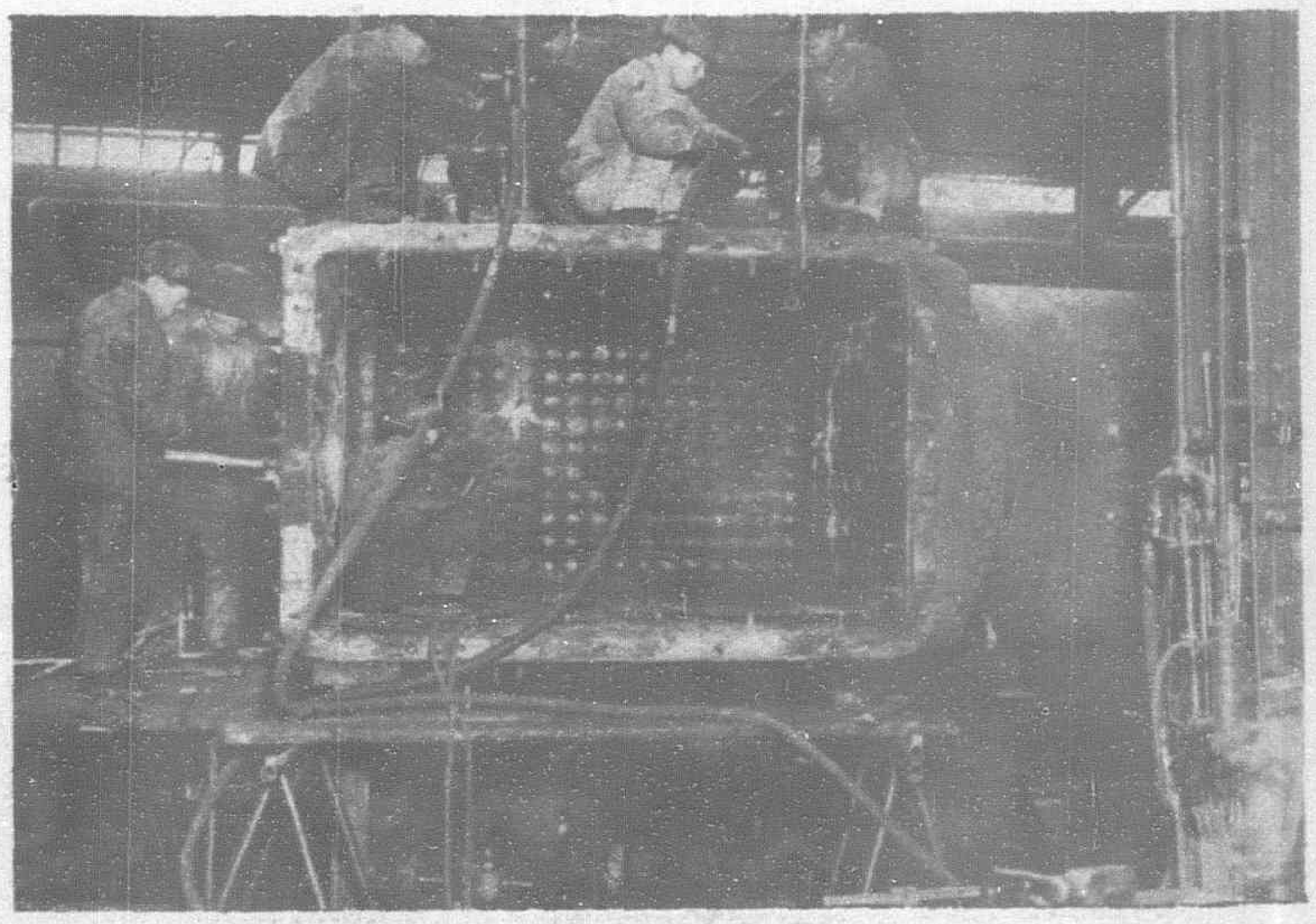
The First Day; 1.30 p.m. Dismounting the Boiler from the Frame



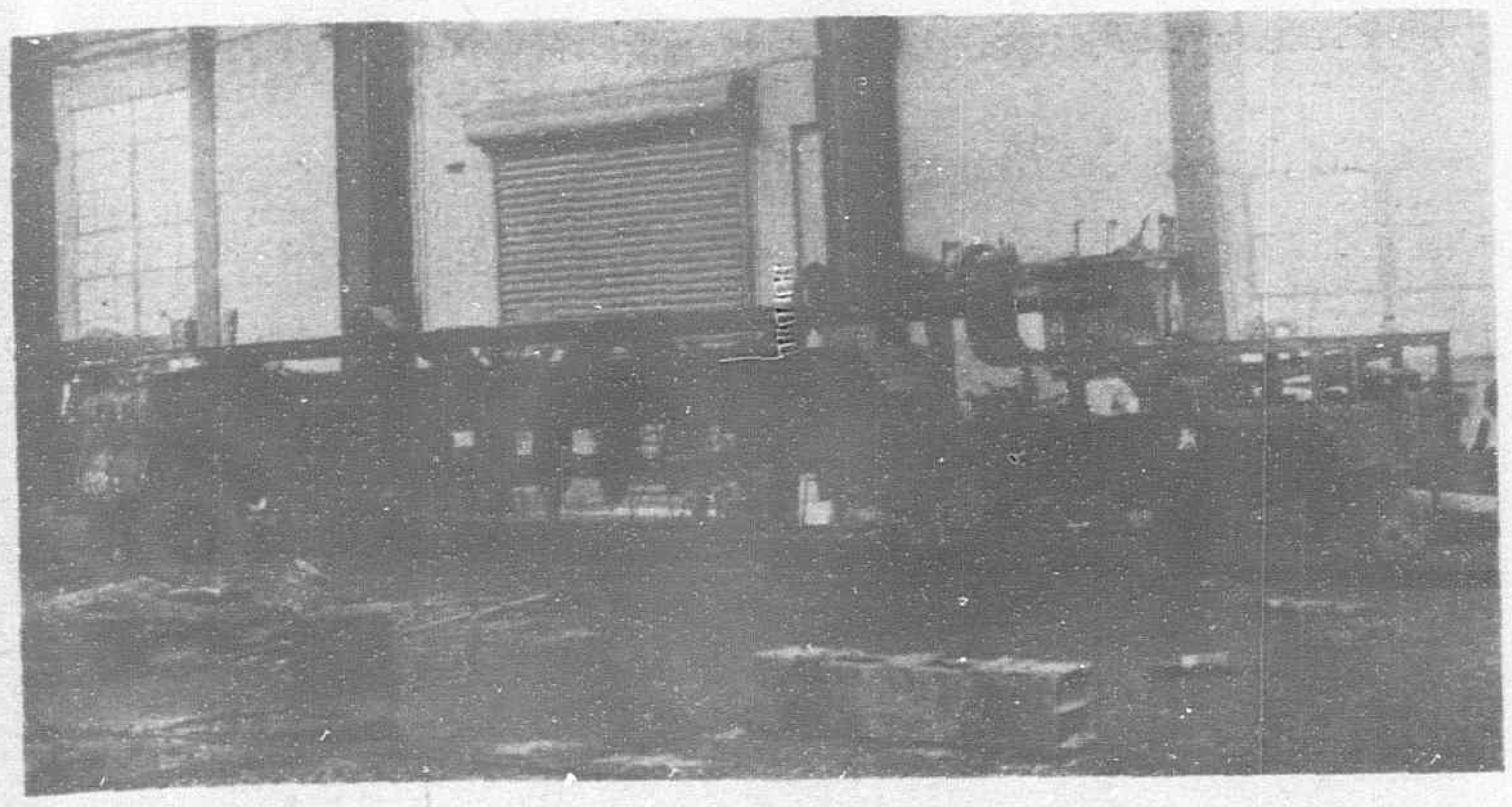
The First Day; 2.00 p.m. Transferring the removed Boiler to the Boiler Shop. One of the Trucks on which the Boiler rests has two Air Reservoirs. Compressed Air accumulated in the Reservoir is led to a Pneumatic Motor which is attached to the Truck, and Through some Gears, drives the Truck, enabling the Boiler to move automatically



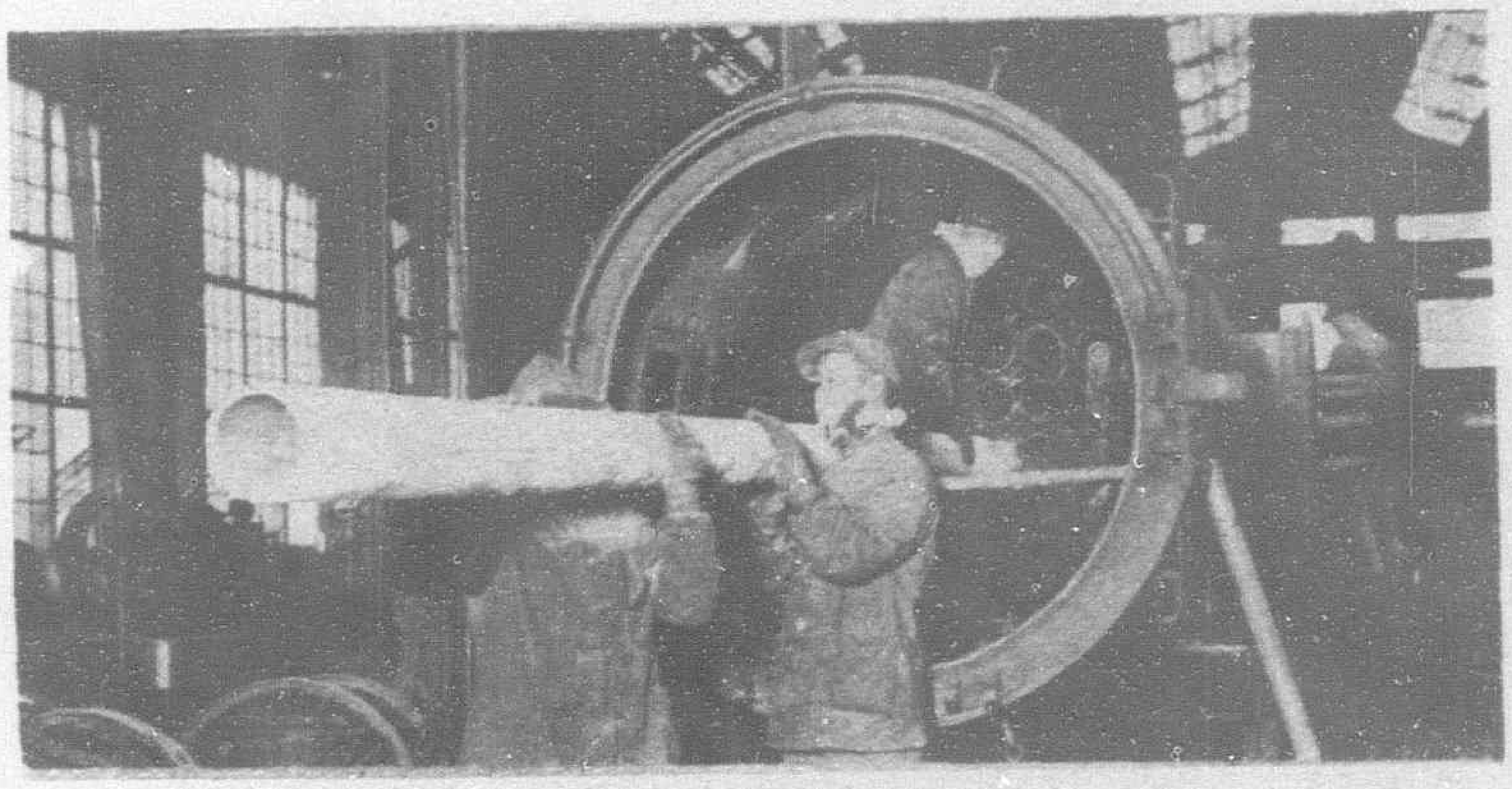
The First Day; 2.20 p.m. Showing the Interior Condition of the Inside First Box Just Before the Repair



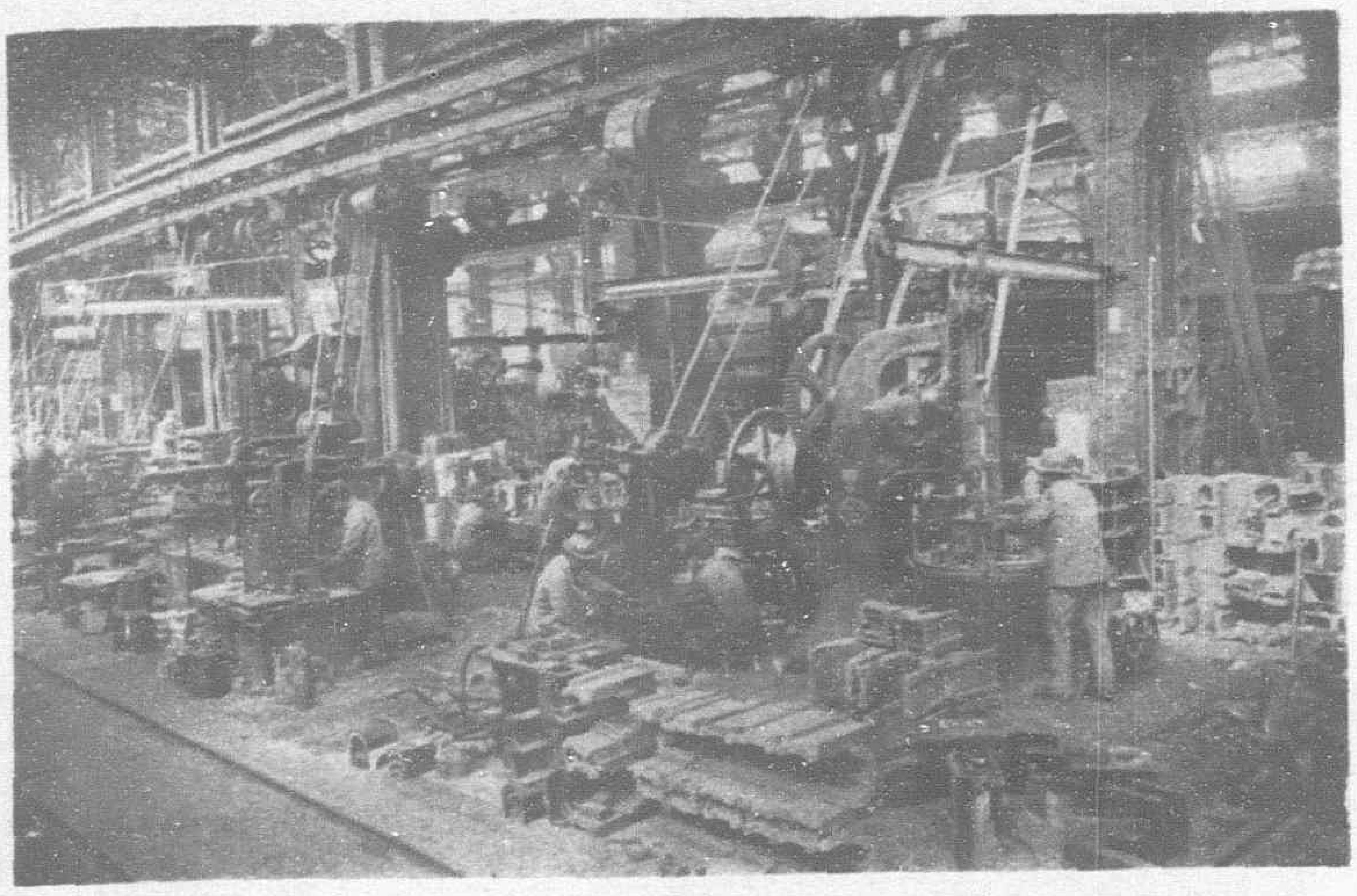
The First Day; 3.00 p.m. Beginning of the Boiler Repair—Drilling off and Cutting Off the Parts to be Repaired



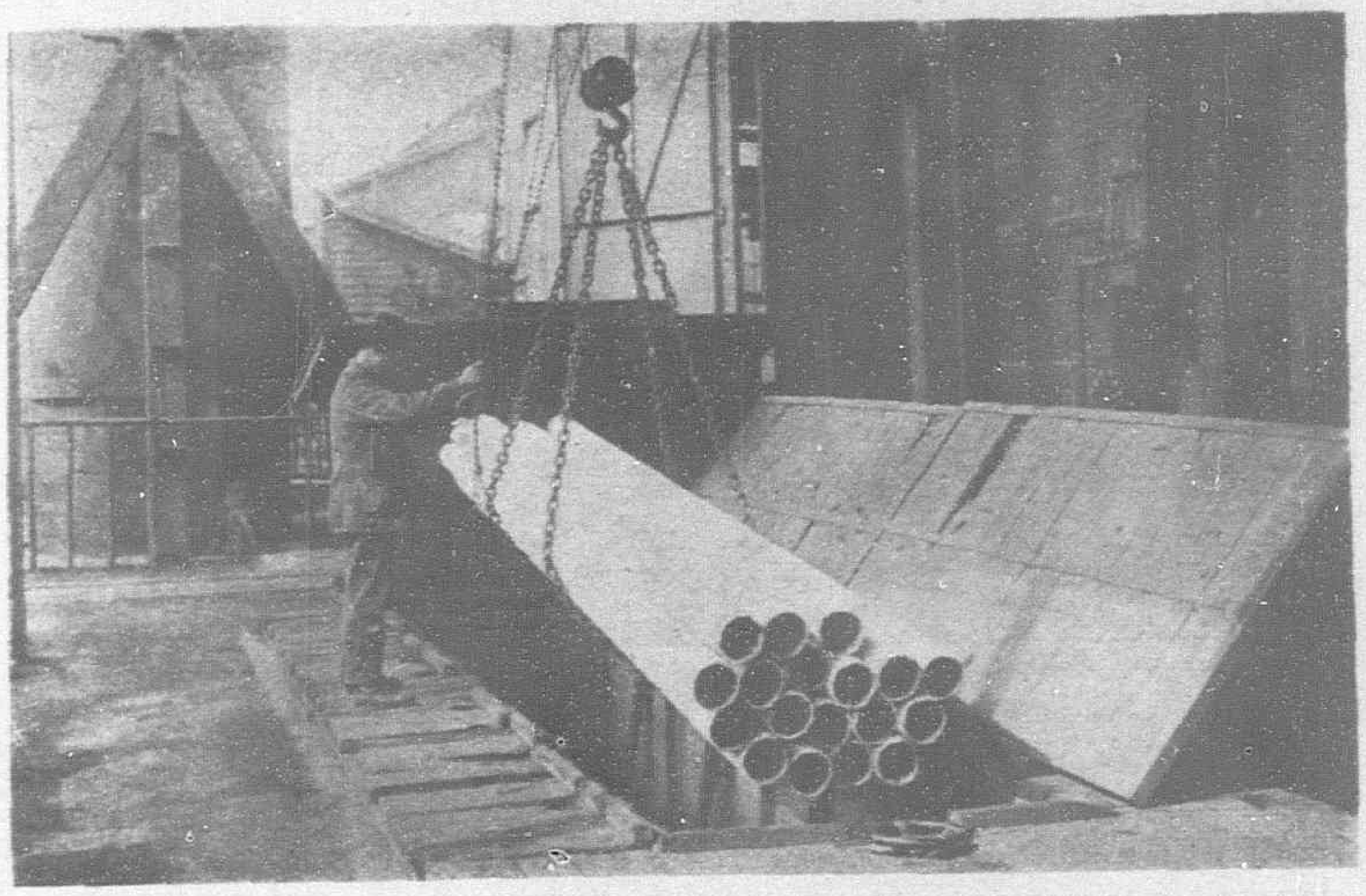
The First Day; 3.00 p.m. The Skeleton View of the Frame



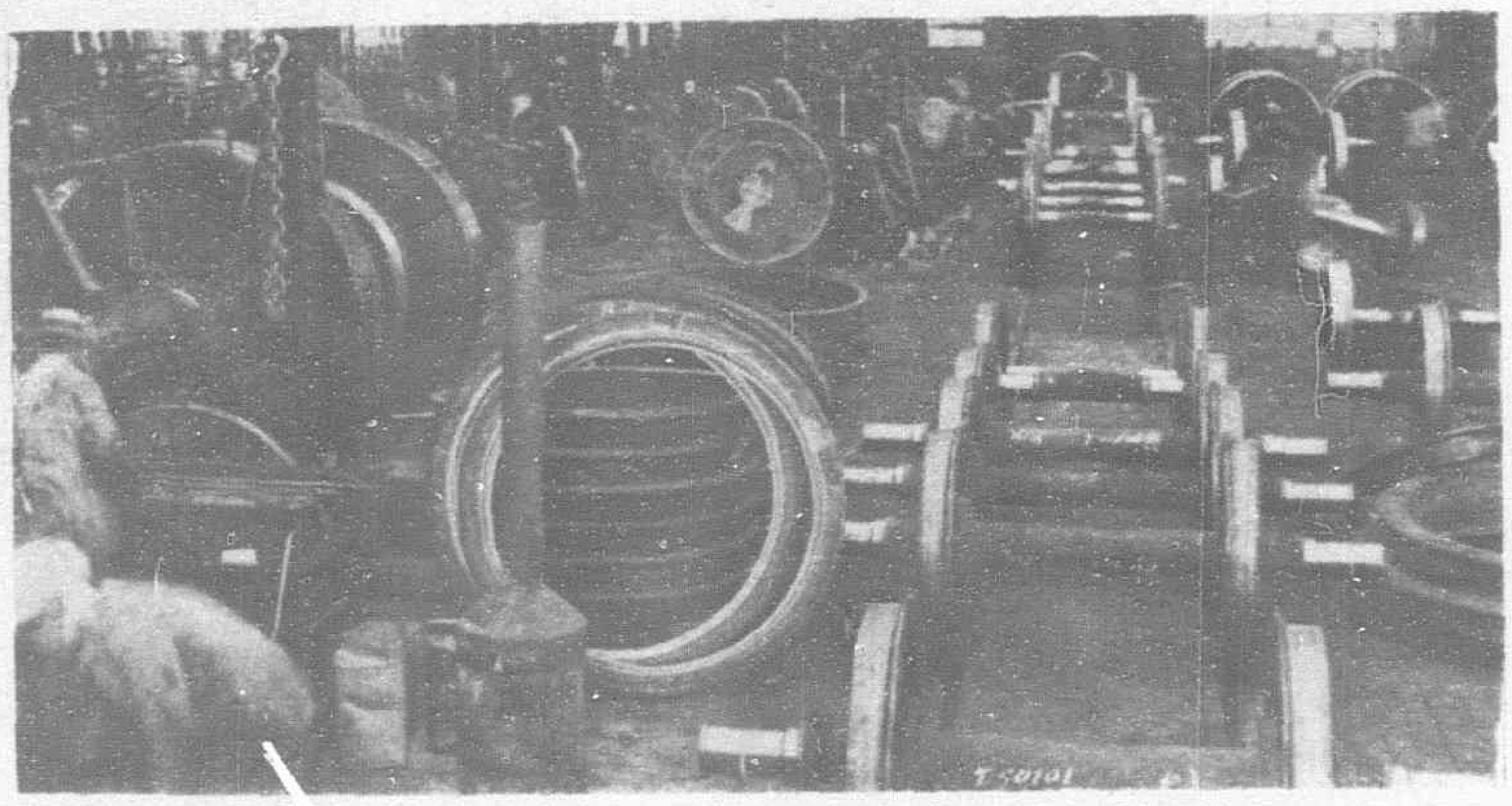
The First Day; 3.30 p.m. Taking Out of the Smoke Tubes



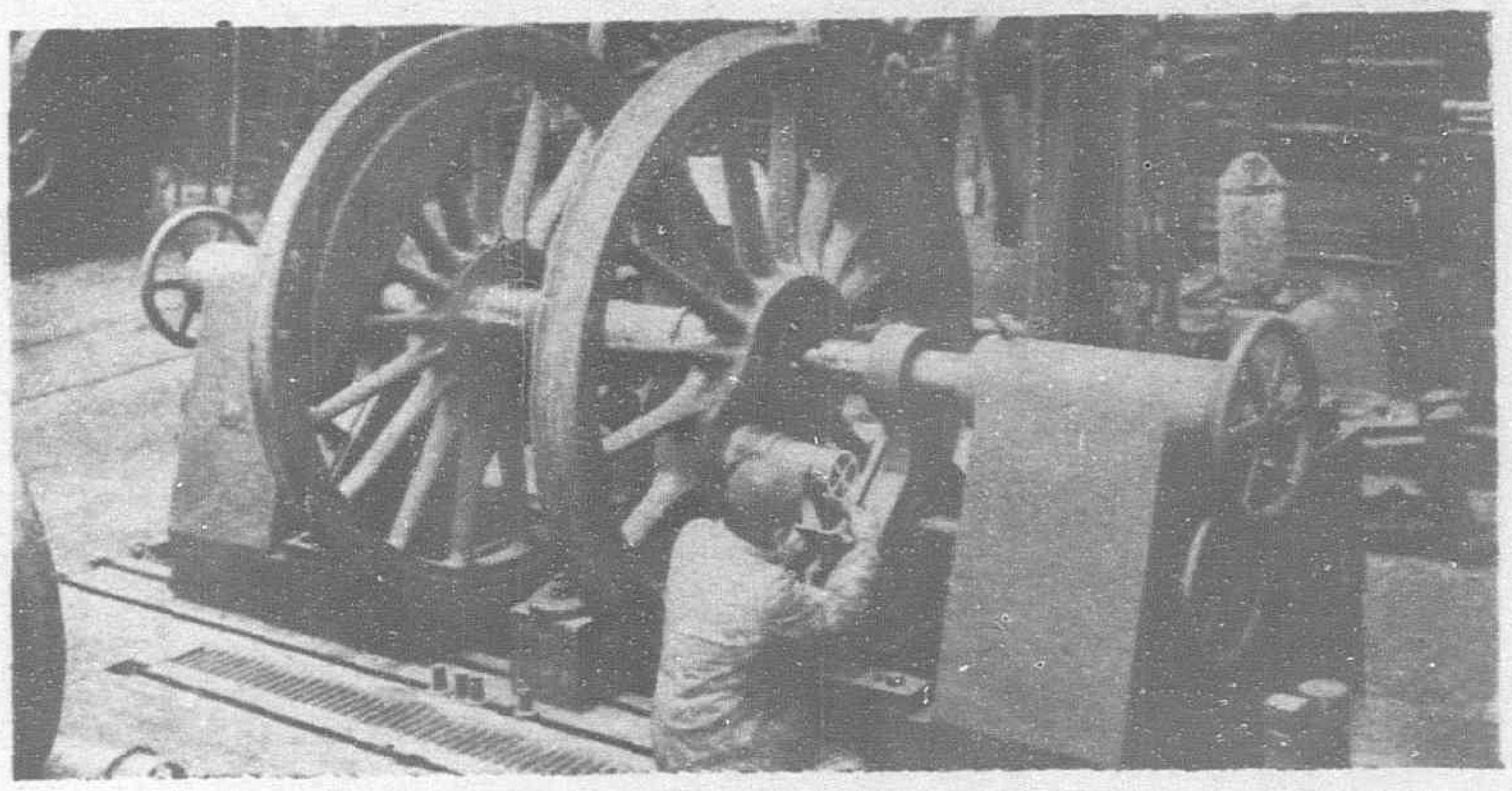
The Second Day; 8.00 a.m. Taking Off the Old Brass From the Axle Boxes Before They are Sent to the Foundry Shop for the New Brass Dressing



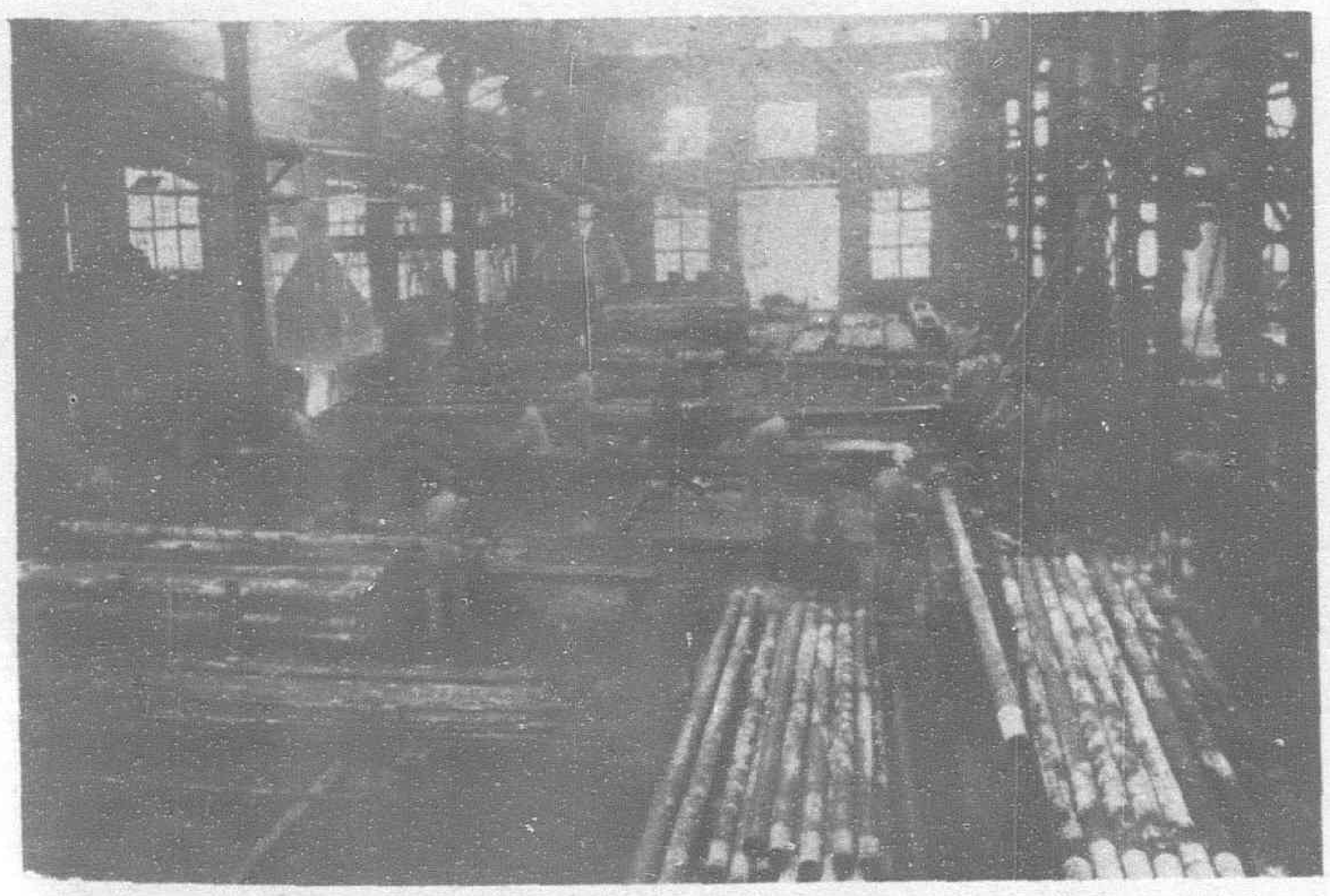
The Second Day; 10.00 a.m. Putting Large Smoke Tubes in the Tube Cleaner (Boiler Shop)



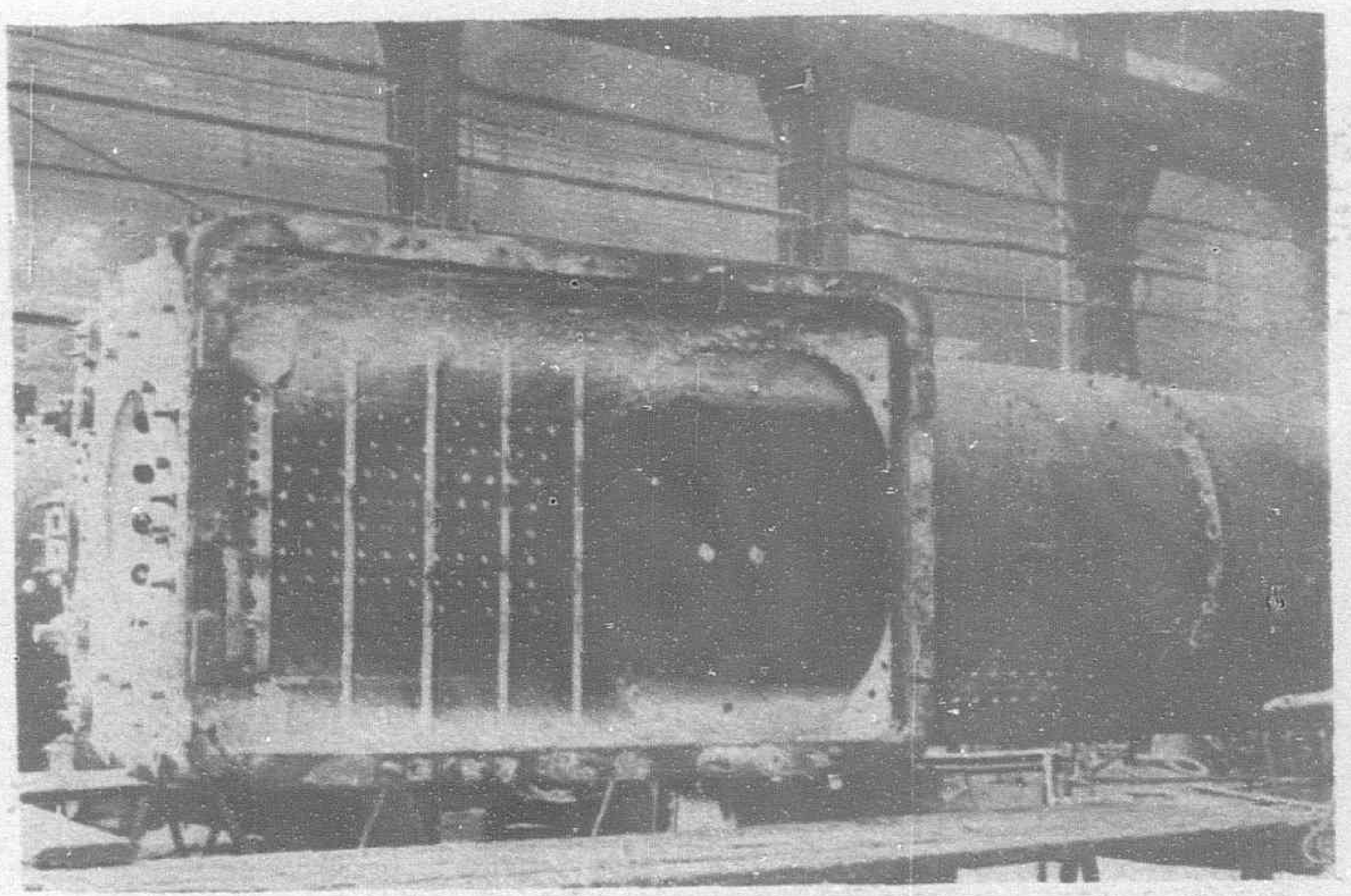
The Second Day; 10.00 a.m. General Interior View of the Wheel Shop



The Second Day; 10.50 a.m. Checking the Crank Pin Angles with Quartering Machine



The Second Day; 11.00 a.m. Interior View of the Smoke Tube Repair Shop



The Second Day; 1.00 p.m. Showing the Inside of the Outside Fire Box After the Inside Fire Box Being Taken Off

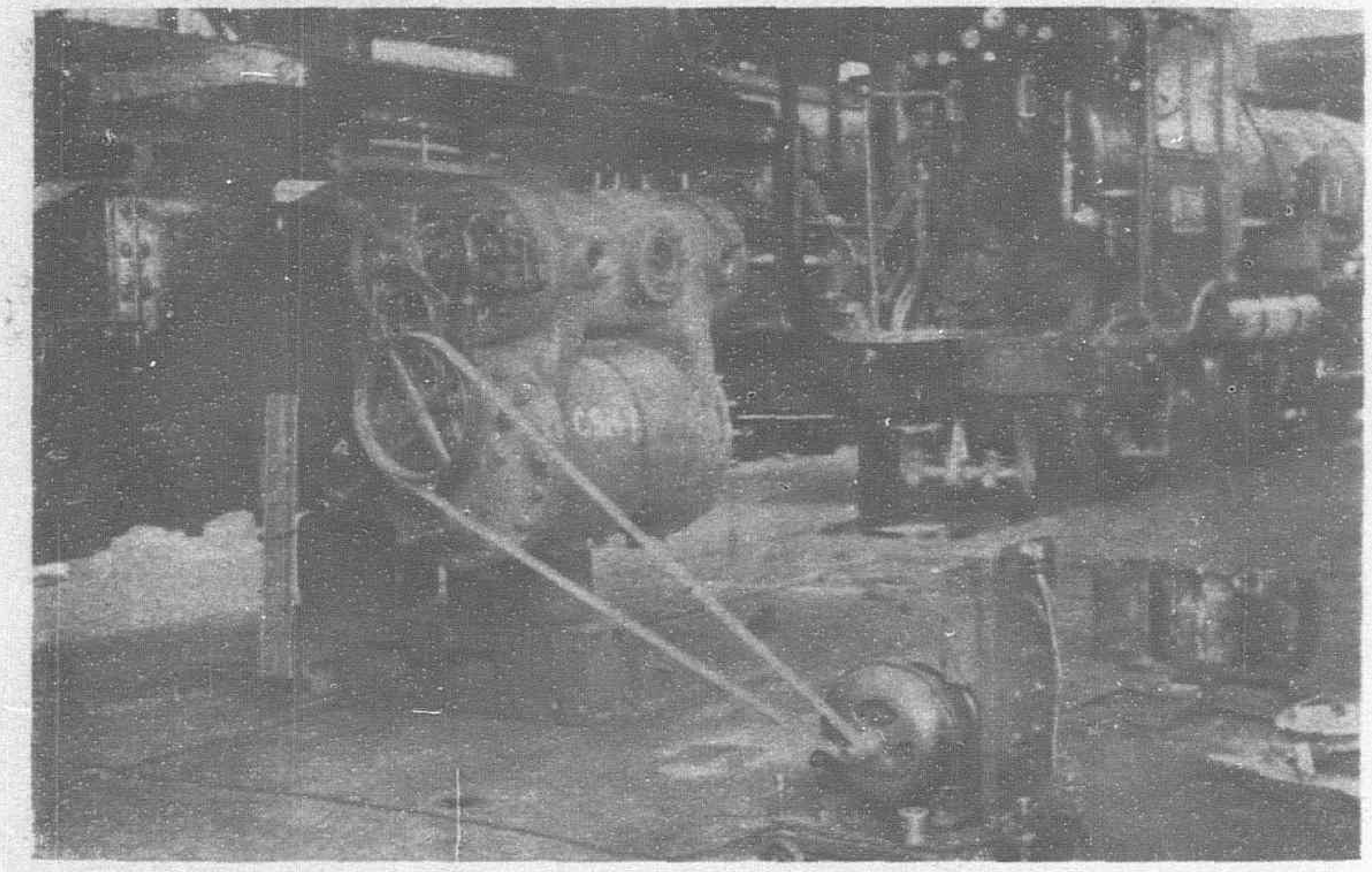
TABLE NO. 2

Class of Repairs	*Kind of Locom.*	*At the Omiya Works*	*Total in the Govn't. Rys.*
General Repairs	Steam Locom.	166	1,290
,, ,,	Electric Locom.	60	60
Light Repairs	Steam Locom.	343	2,629
,, ,,	Electric Locom.	38	38
Total		607	4,017

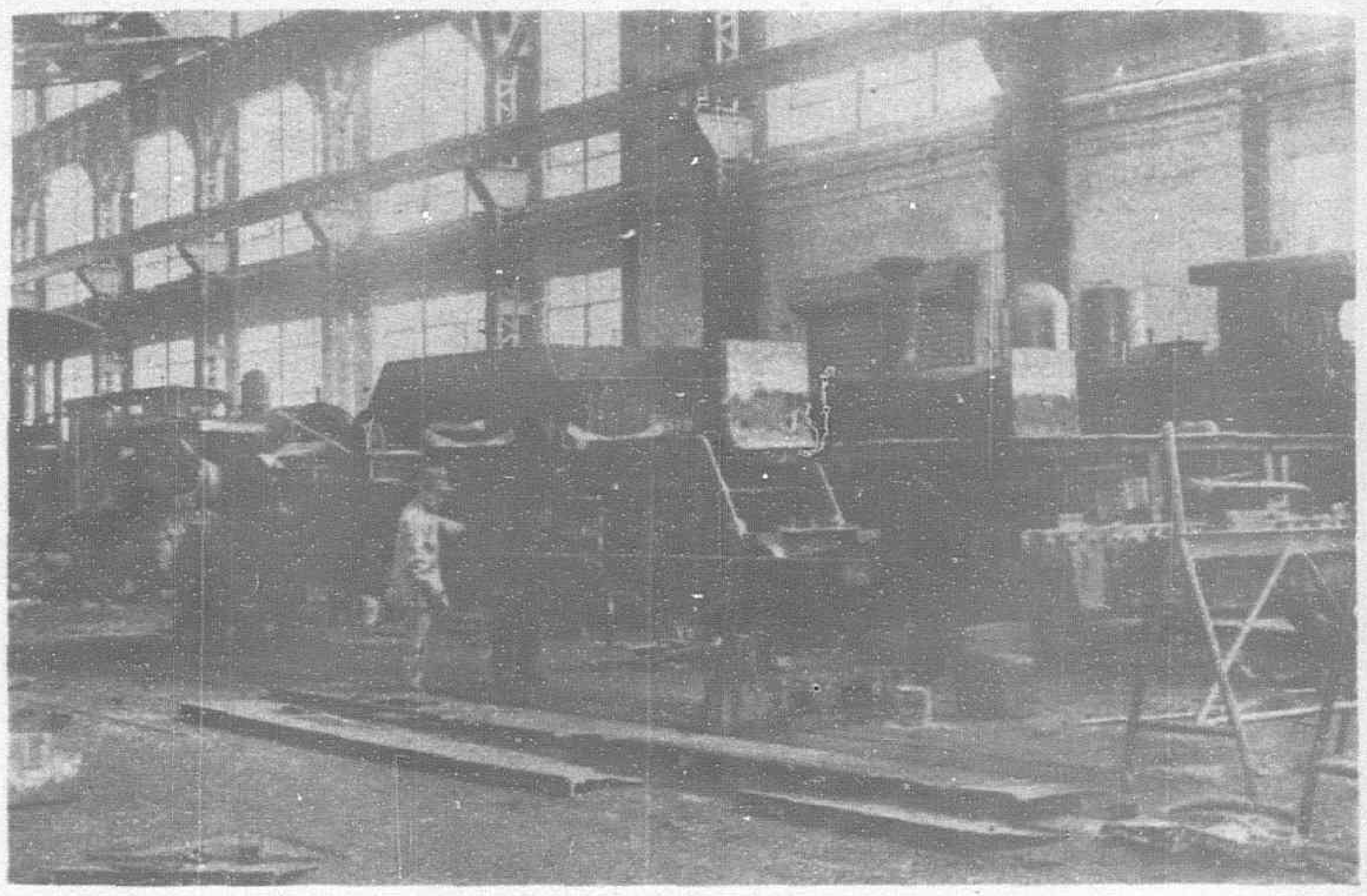
2) *Procedure of entering Works, and Schedule of entering and leaving Works.*

To decide the number of locomotives to be sent to the works for repairs, each local traffic office collects data, by the middle of the previous months, from round-houses under its jurisdiction and sends the data to the works through the operating and mechanical sections in the local region, together with the report of the repair parts of the locomotive.

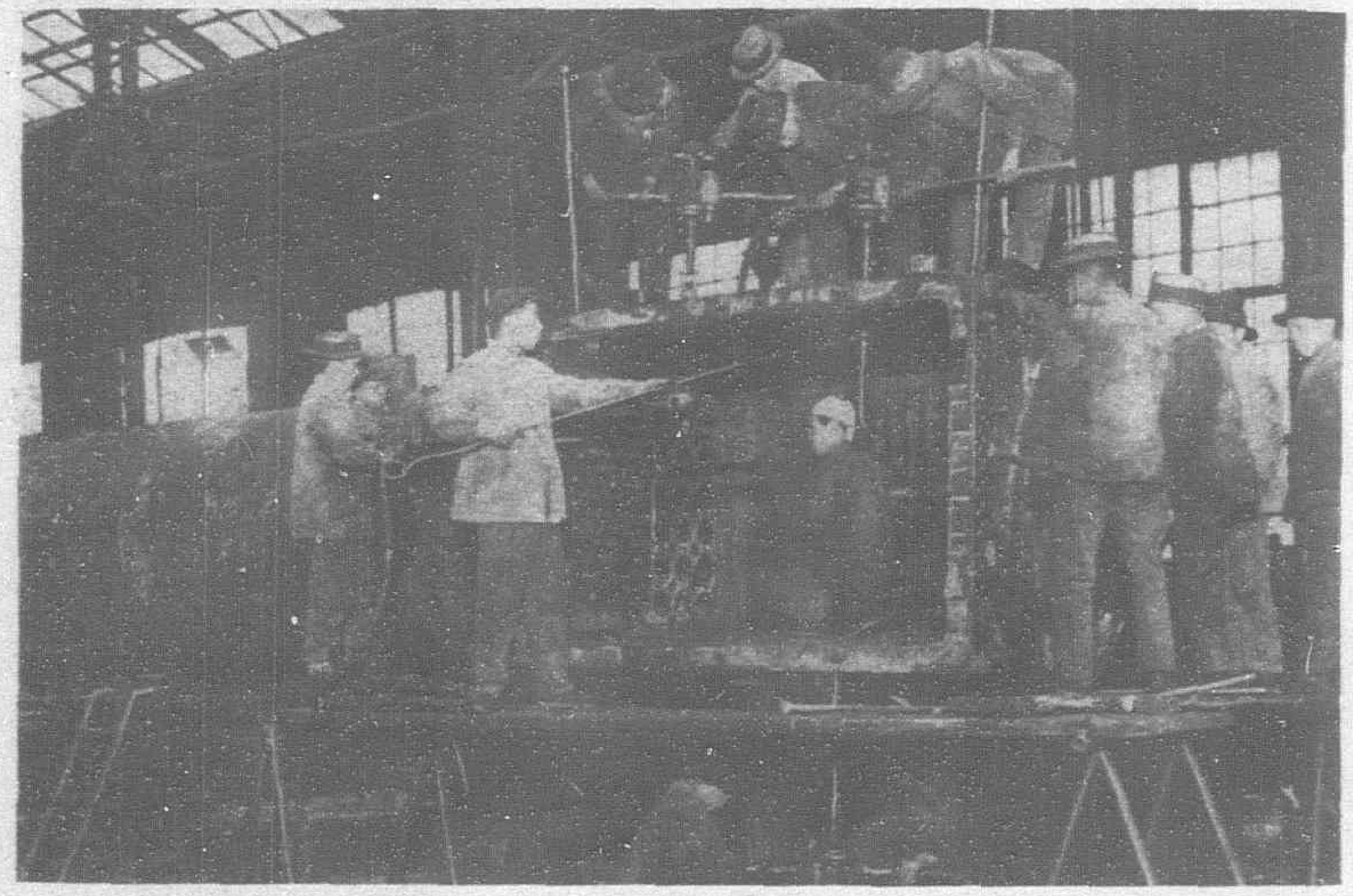
The clerk in charge in the 1st Engineering section of the works, who receives the data as well as the report of repair parts from



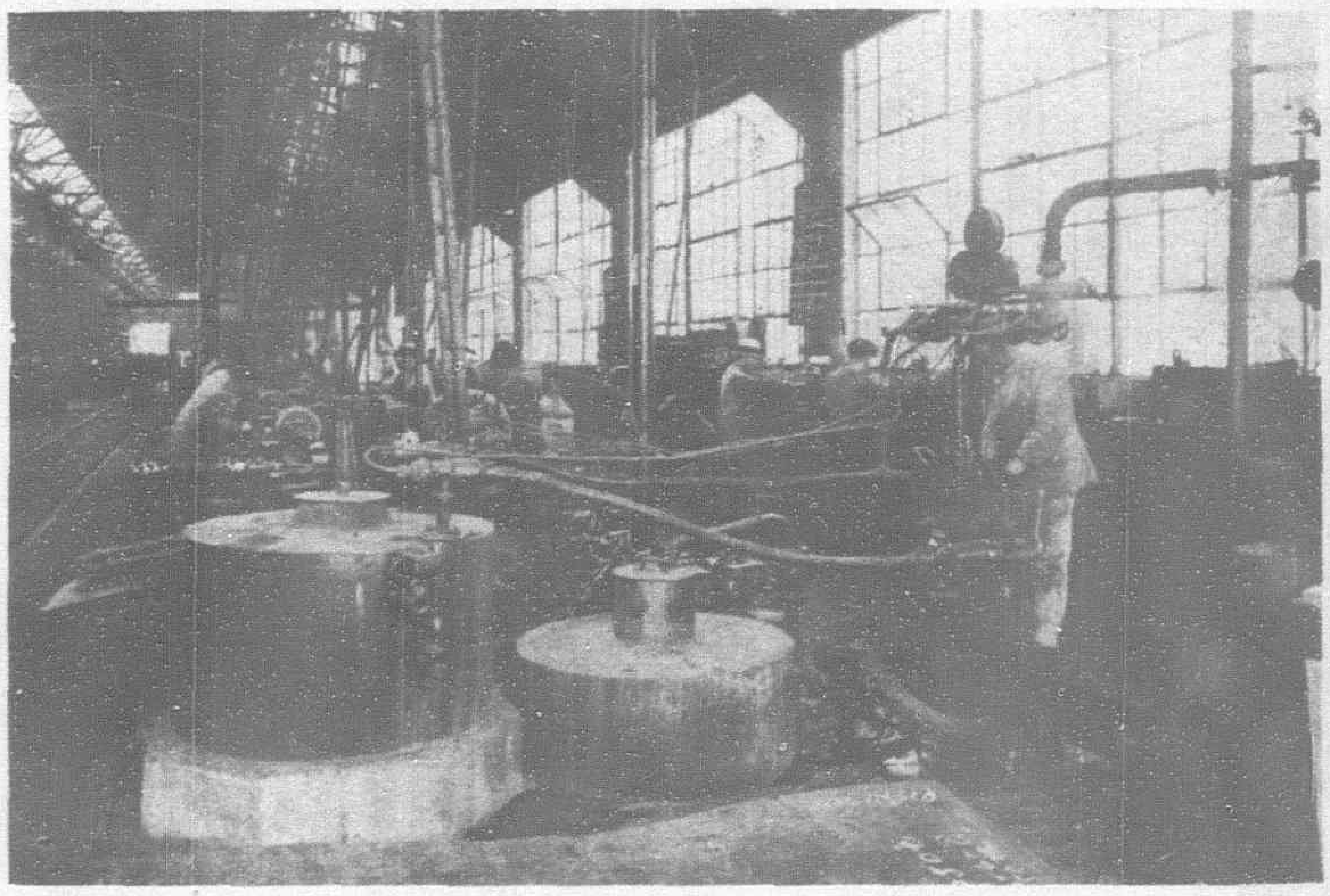
The Third Day; 9.00 a.m. Showing the Reboring Work of the Valve Chest



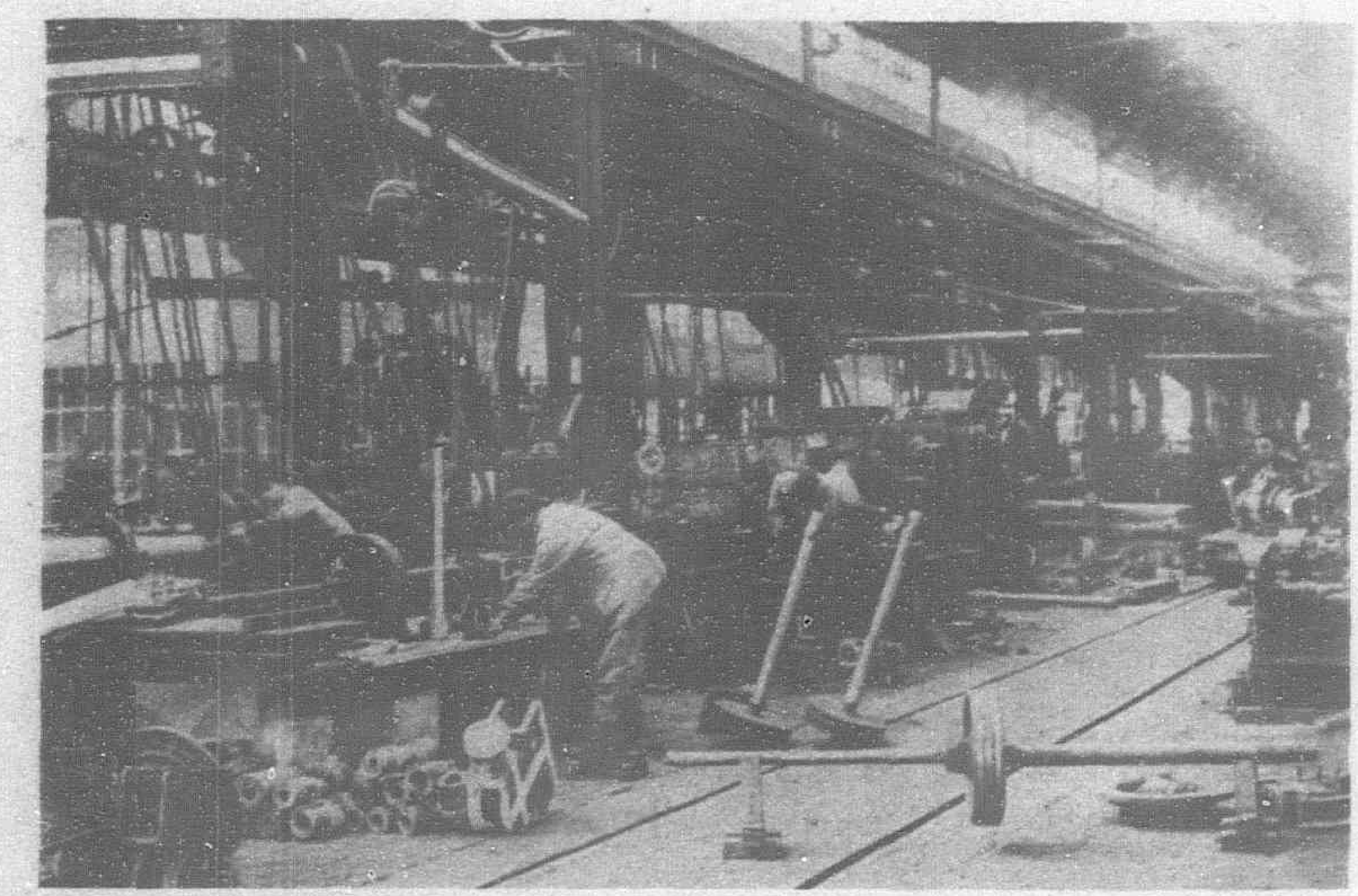
The Third Day; 10.00 a.m. Checking Deformation of the Frame and the Angle of the Horn Block



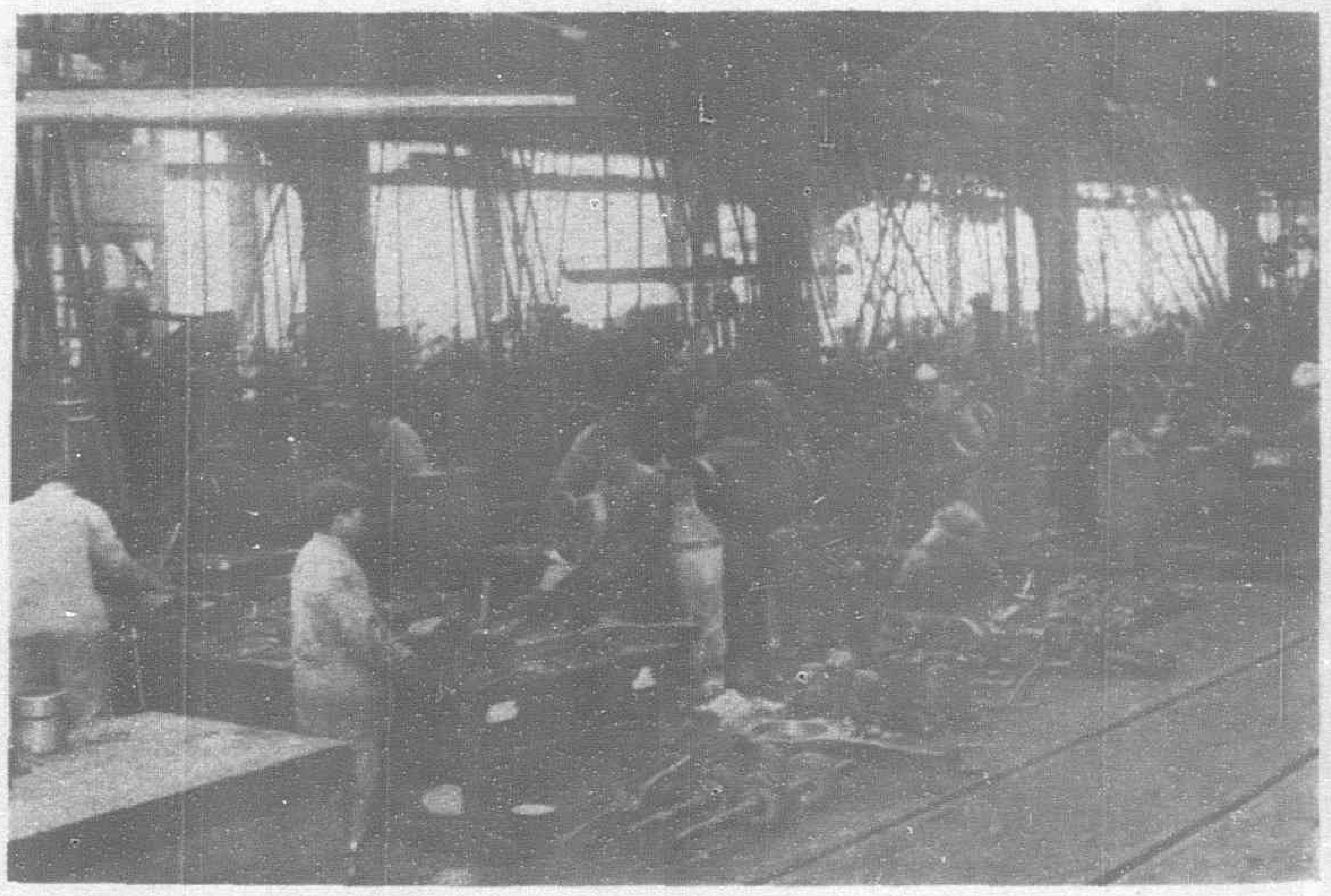
The Third Day; 10.30 a.m. Threading Stay Holes and Beading the Smoke Tube End.



The Third Day; 3.00 p.m. The Vacuum Ejector and Injector Testing Shop



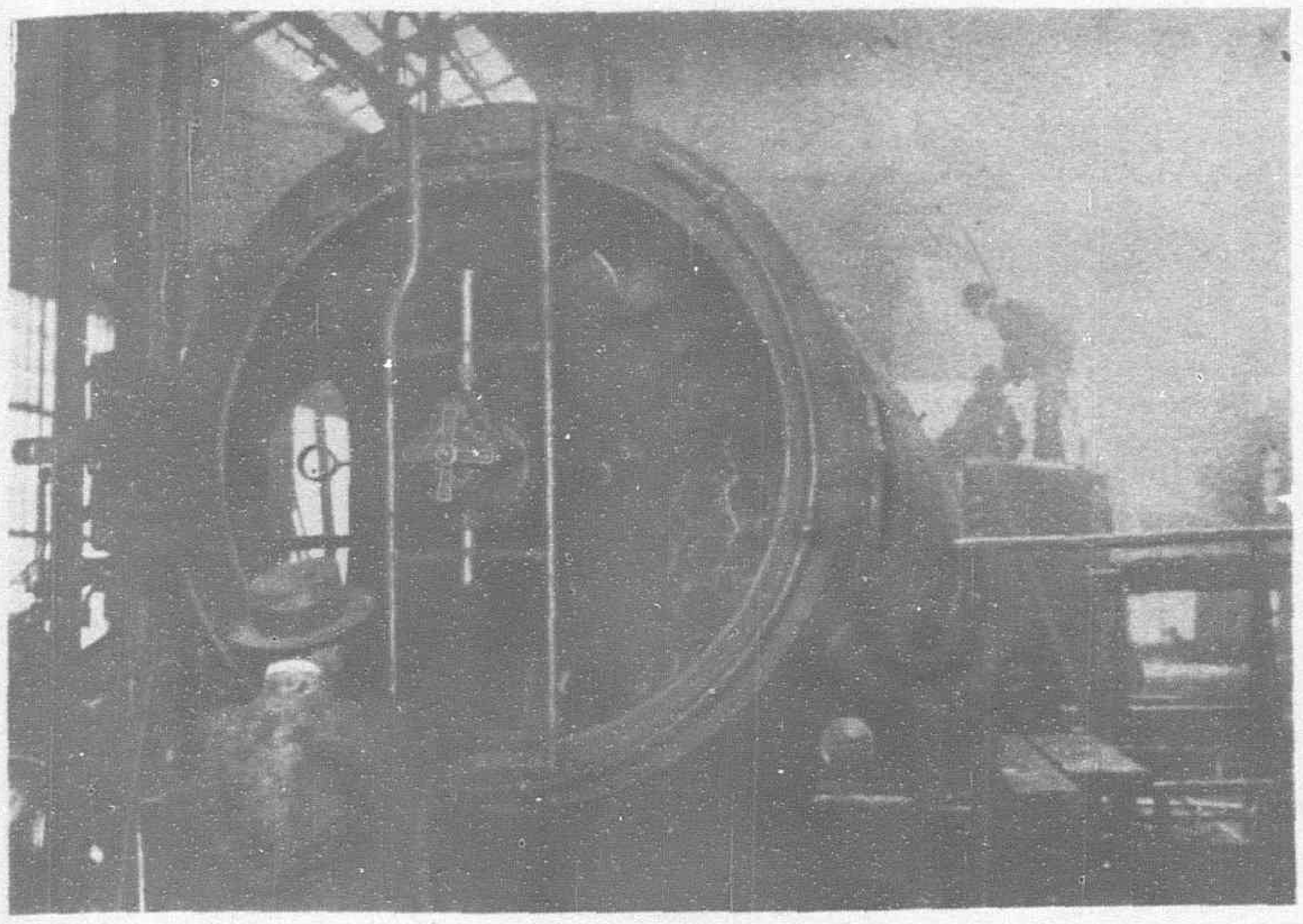
The Fourth Day; 9.00 a.m. Centering of the Piston Rod



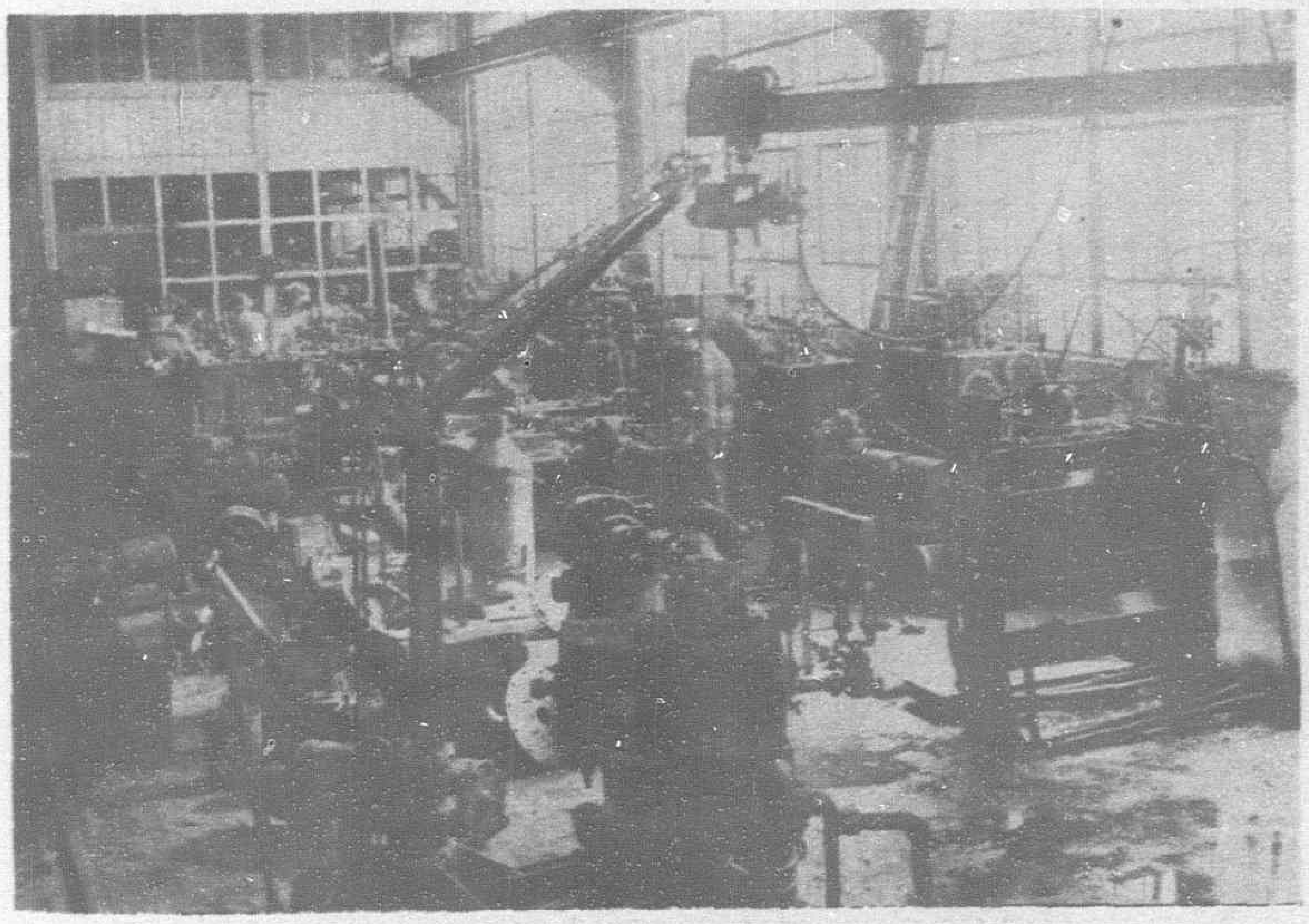
The Fourth Day; 10.00 a.m. The Valve Gear Repair Shop—Showing the Hand Finish of the Eccentric Sheave

local traffic offices, which are located within the repair territory of the works, drafts a *pro forma* schedule of the entering and leaving of locomotives, in order to keep constant and even work, taking the capacity of shops into consideration. This schedule is presented for discussion to a conference composed of representatives from the operating and mechanical sections as well as the Works officials. As the result of the discussion, a definite schedule, is made by the 25th of every month and distributed among those concerned.

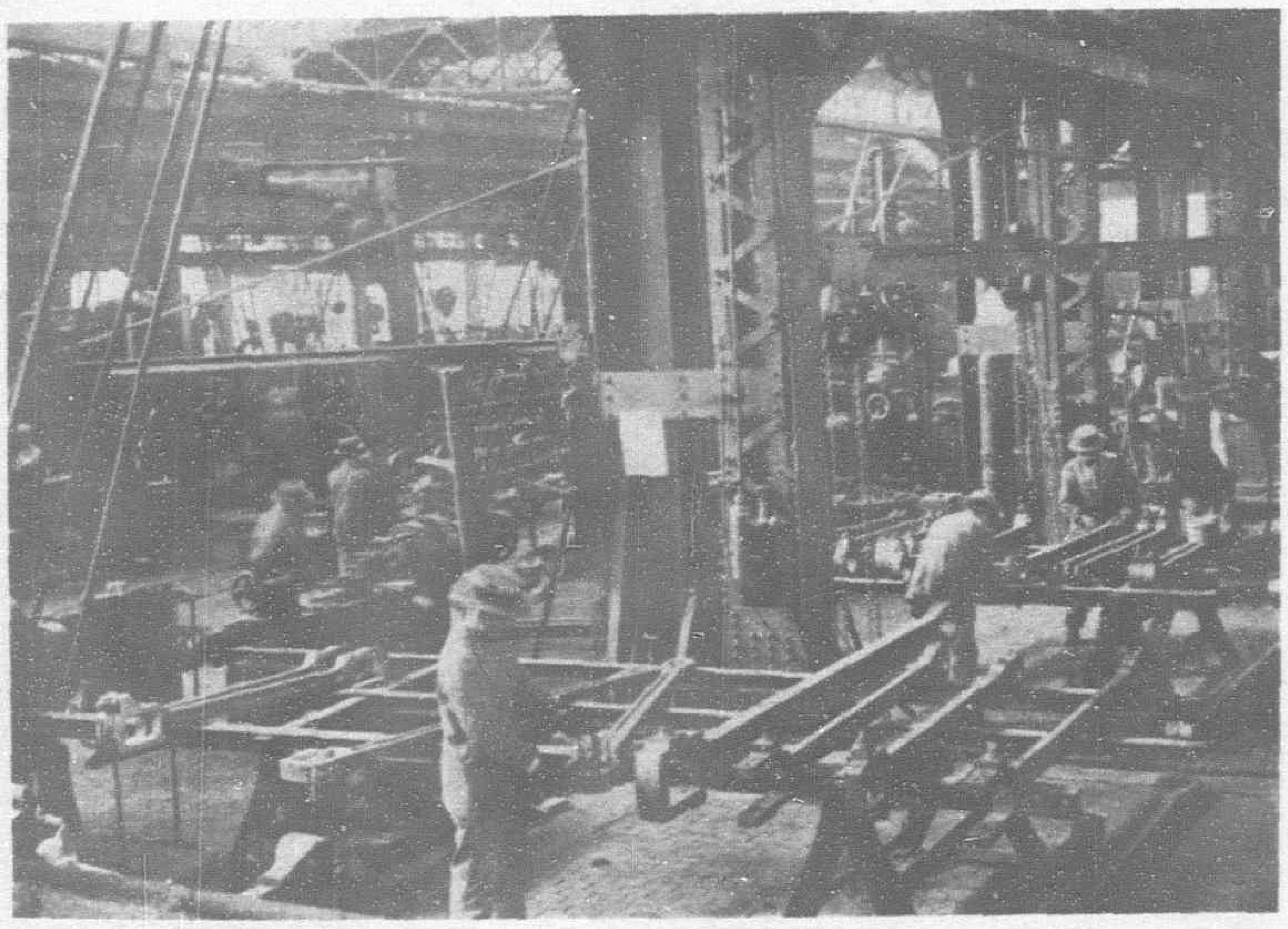
On completion of the definite schedule, a list entitled " the list of principal repair parts and alteration work of the locomotive



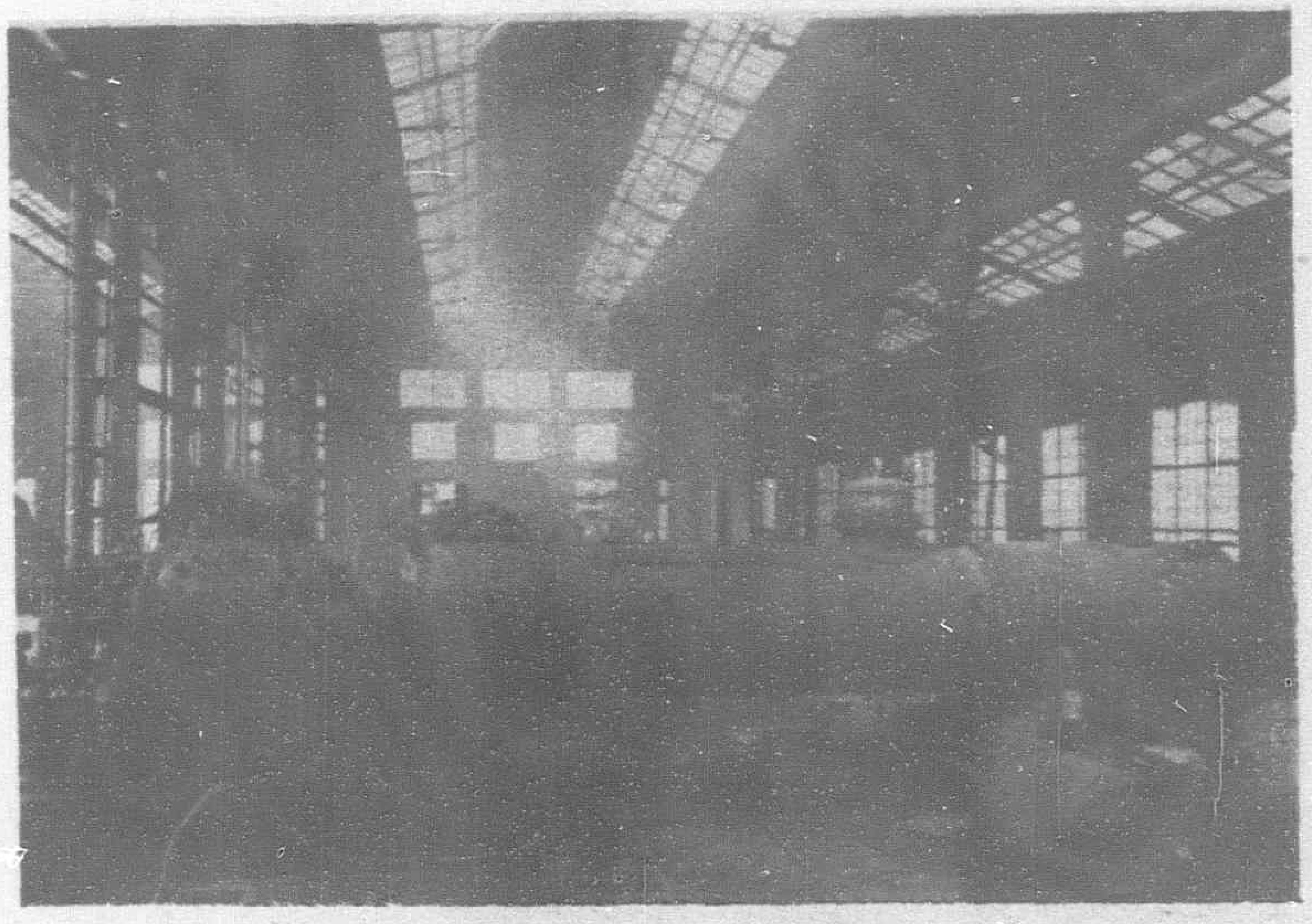
The Fourth Day; 10.00 a.m. Beading of the Smoke Tube End



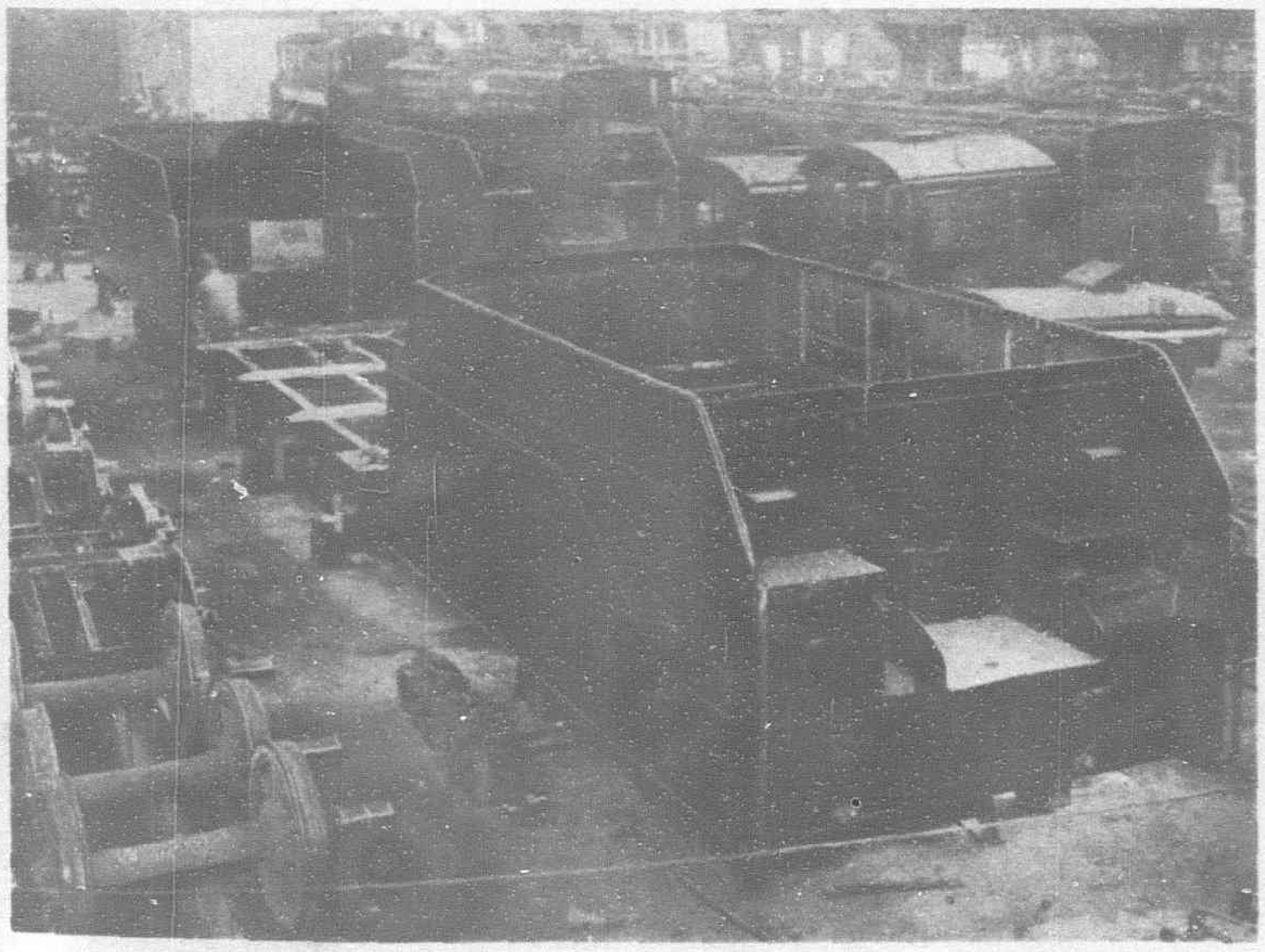
The Fourth Day; 10.00 a.m. The Air-Brake Shop—Inspection, Repair and Test are Executed in this Shop



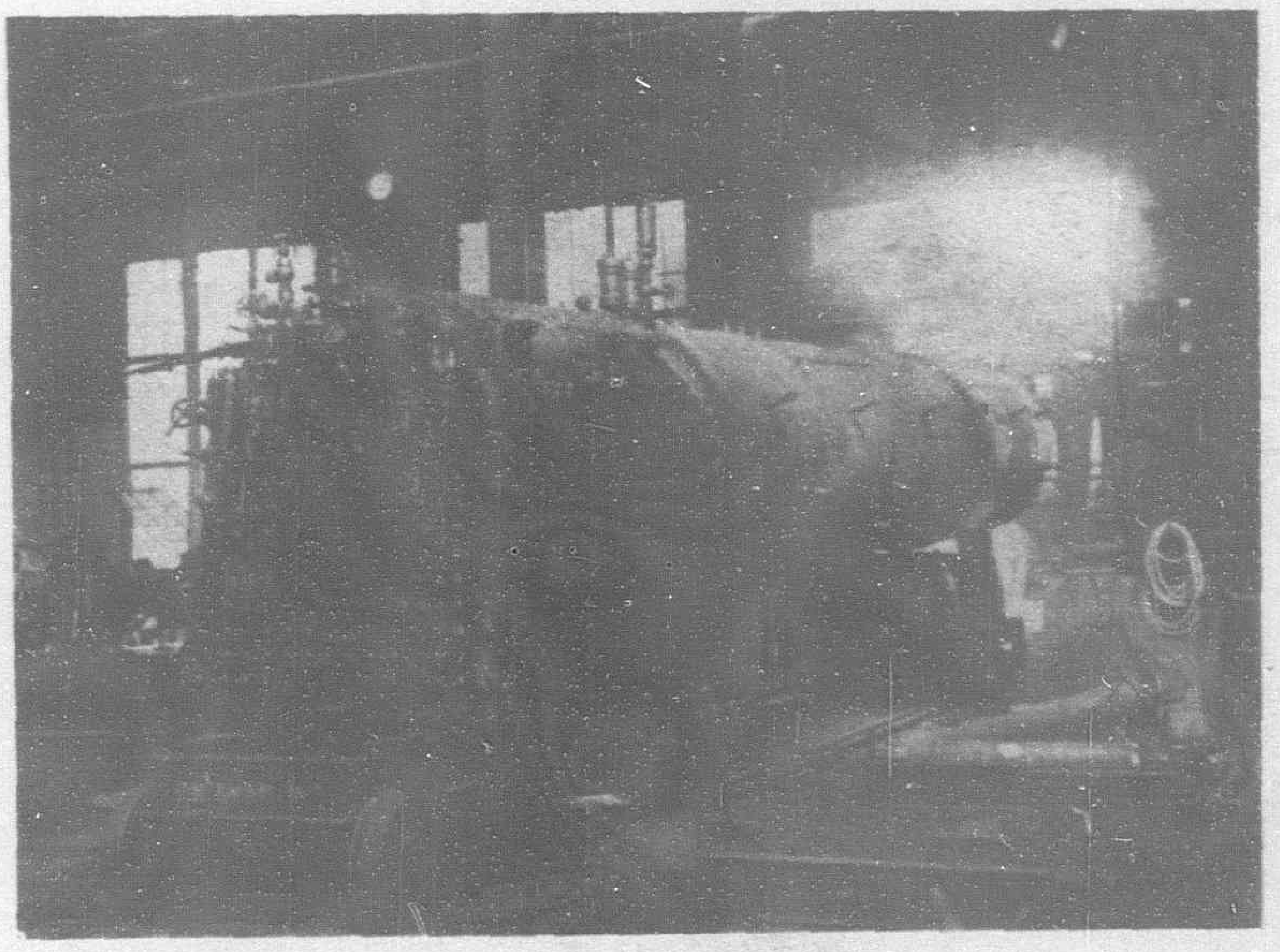
The Fourth Day; 11.00 a.m. Finishing of the Rod—Showing the Rod Brass Being Fixed



The Fourth Day; 1.30 p.m. The Hydraulic Pressure Test of the Boiler



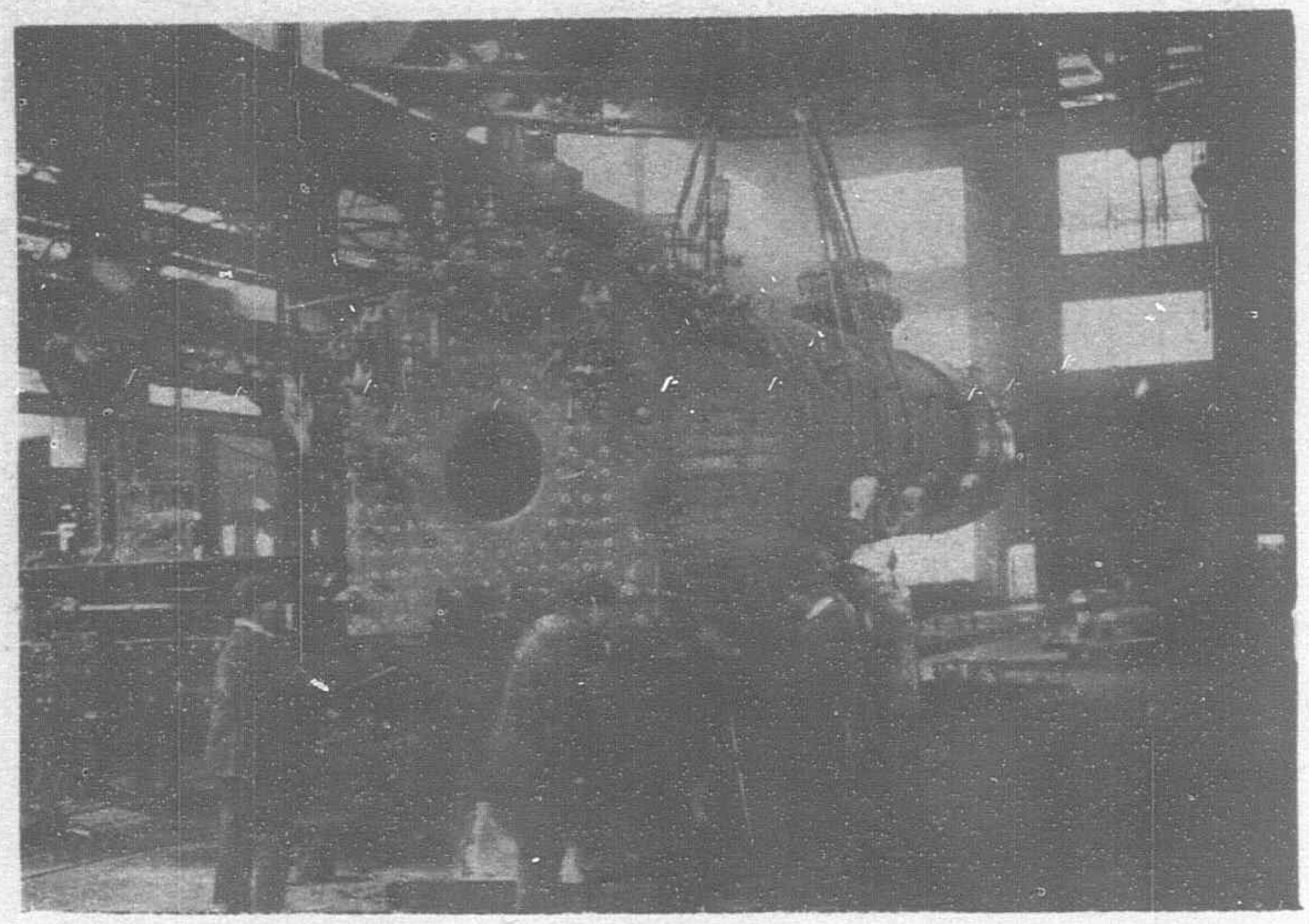
The Fourth Day; 2.00 p.m. The Tender Repair Shop



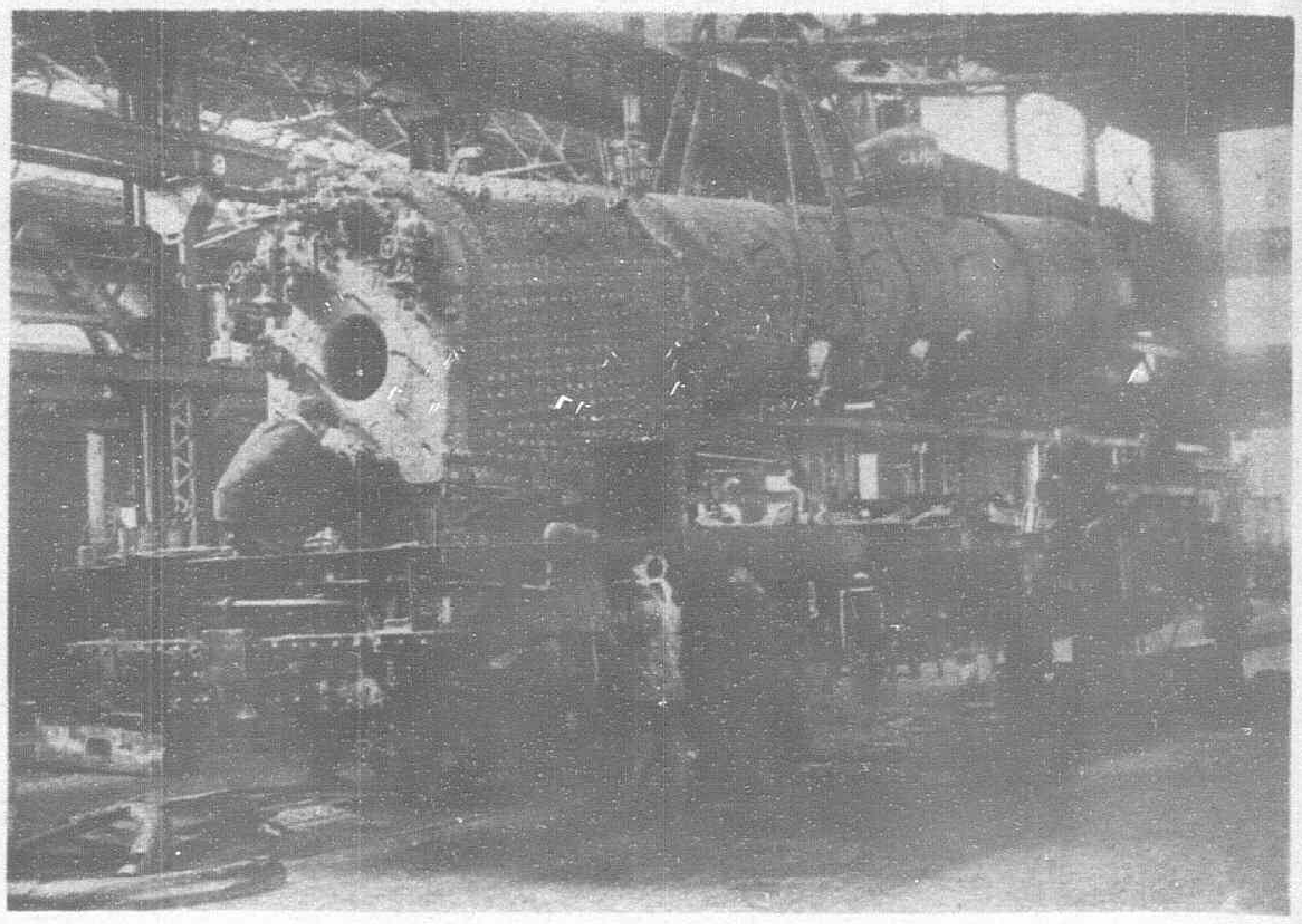
The Fourth Day; 2.00 p.m. Showing the Boiler being Transferred to the Erecting Shop After the Completion of the Repair to be repaired " is made, and the principal repair parts and required alteration, as well as the necessary materials, are described on this list, and all necessary preparation is done prior to the locomotive's coming into the works. This list is most important and essential for the operation of the Works.

3) *Preliminary Inspection.*

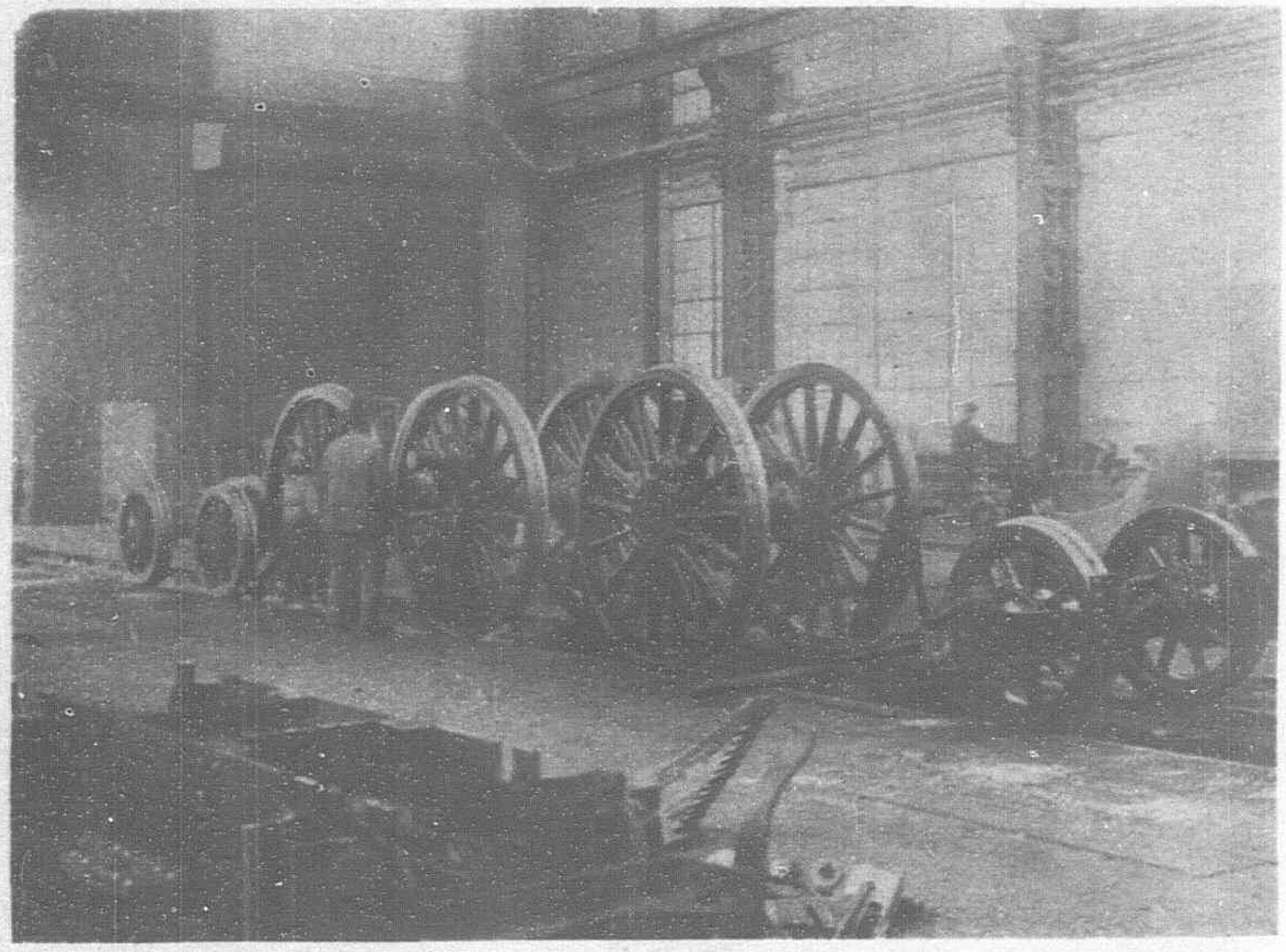
The locomotive scheduled to be sent to the works for repair must be brought to the entering track of the works by 6.30 a.m. on the day specified as its date in.



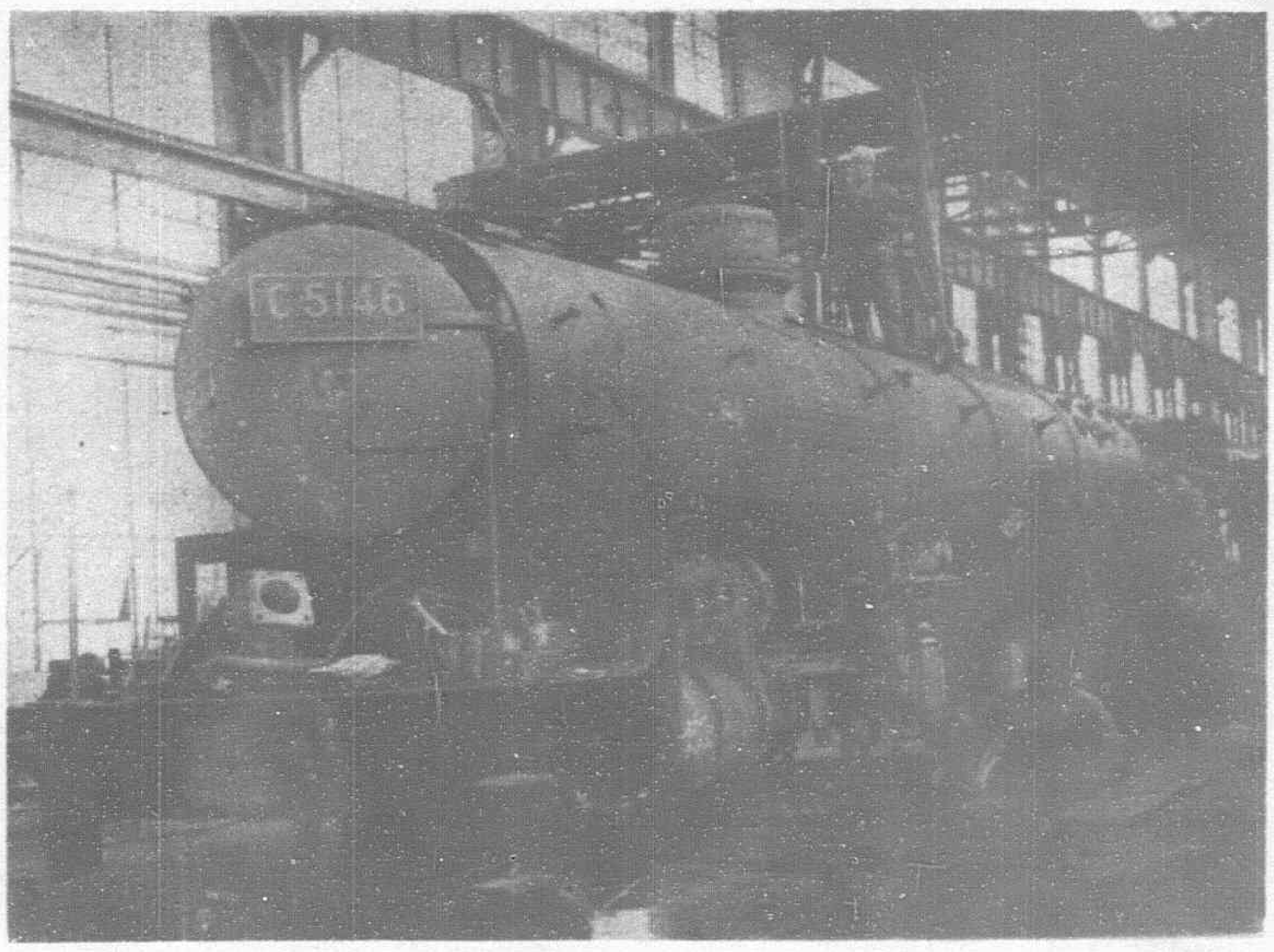
The Fourth Day; 2.25 p.m. Fixing the Ash-pan in the Erecting Shop



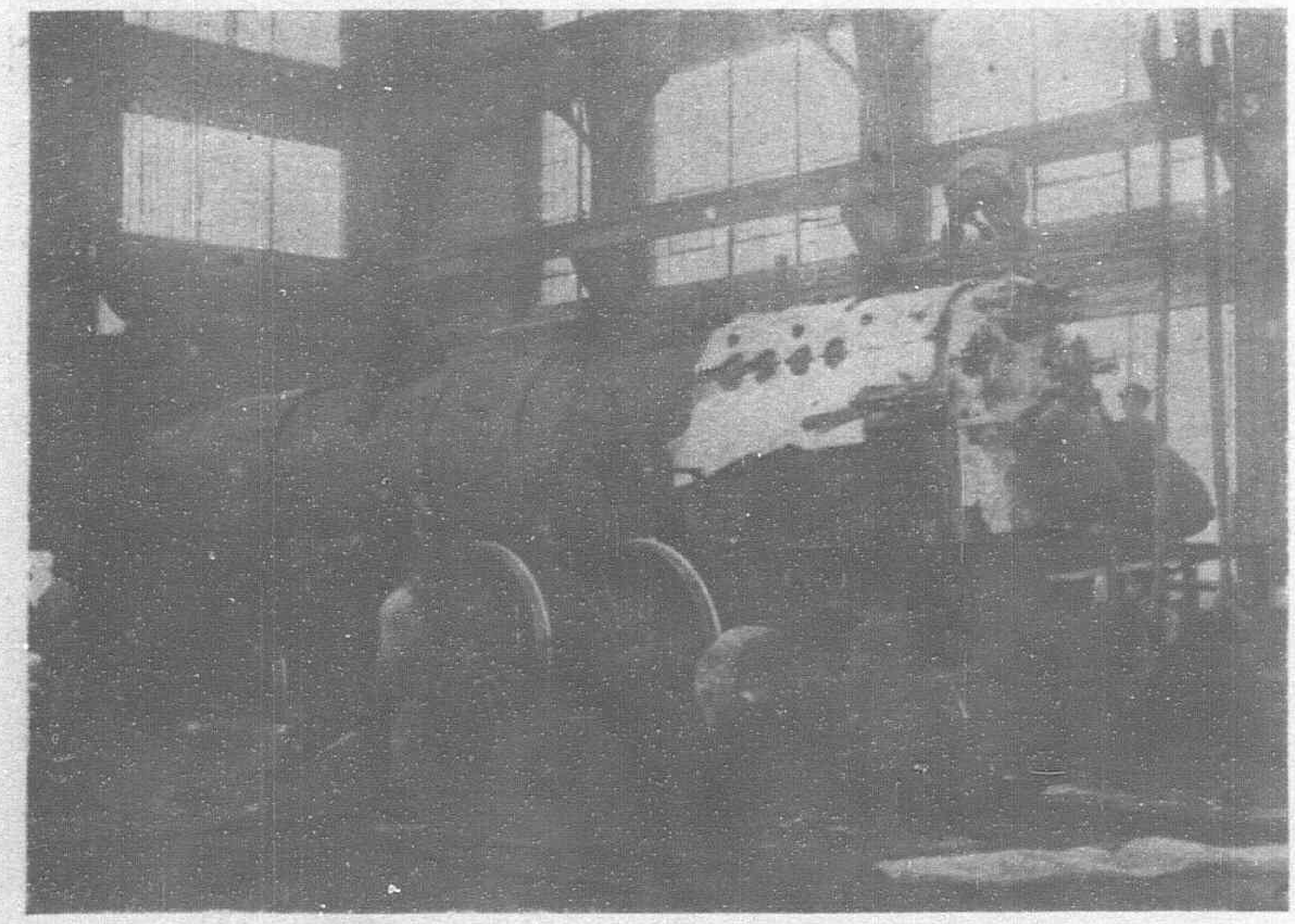
The Fourth Day; 2.30 p.m. Mounting the Boiler on the Frame



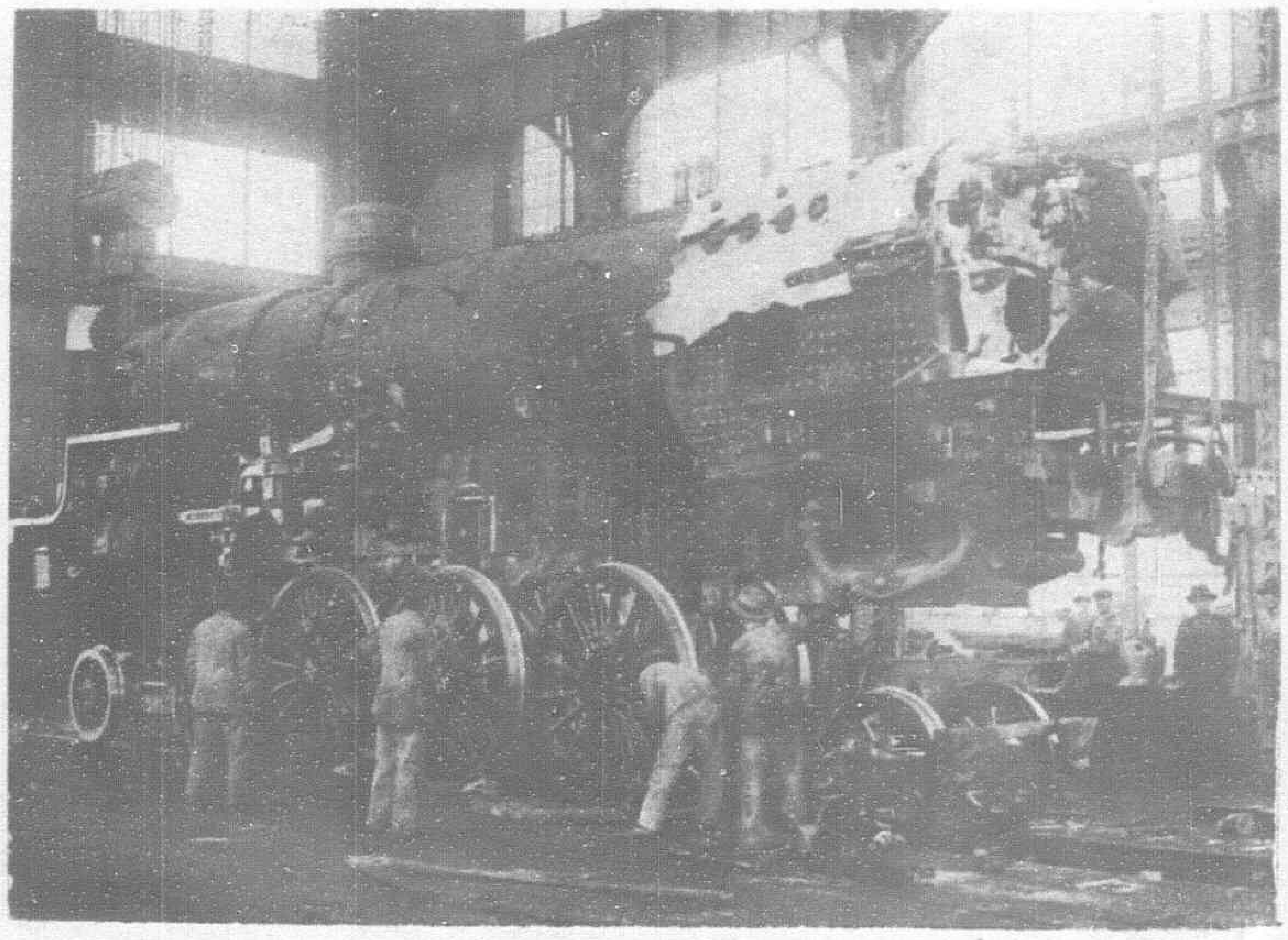
The Fourth Day; 2.30 p.m. Showing the Wheels Ready for Wheeling



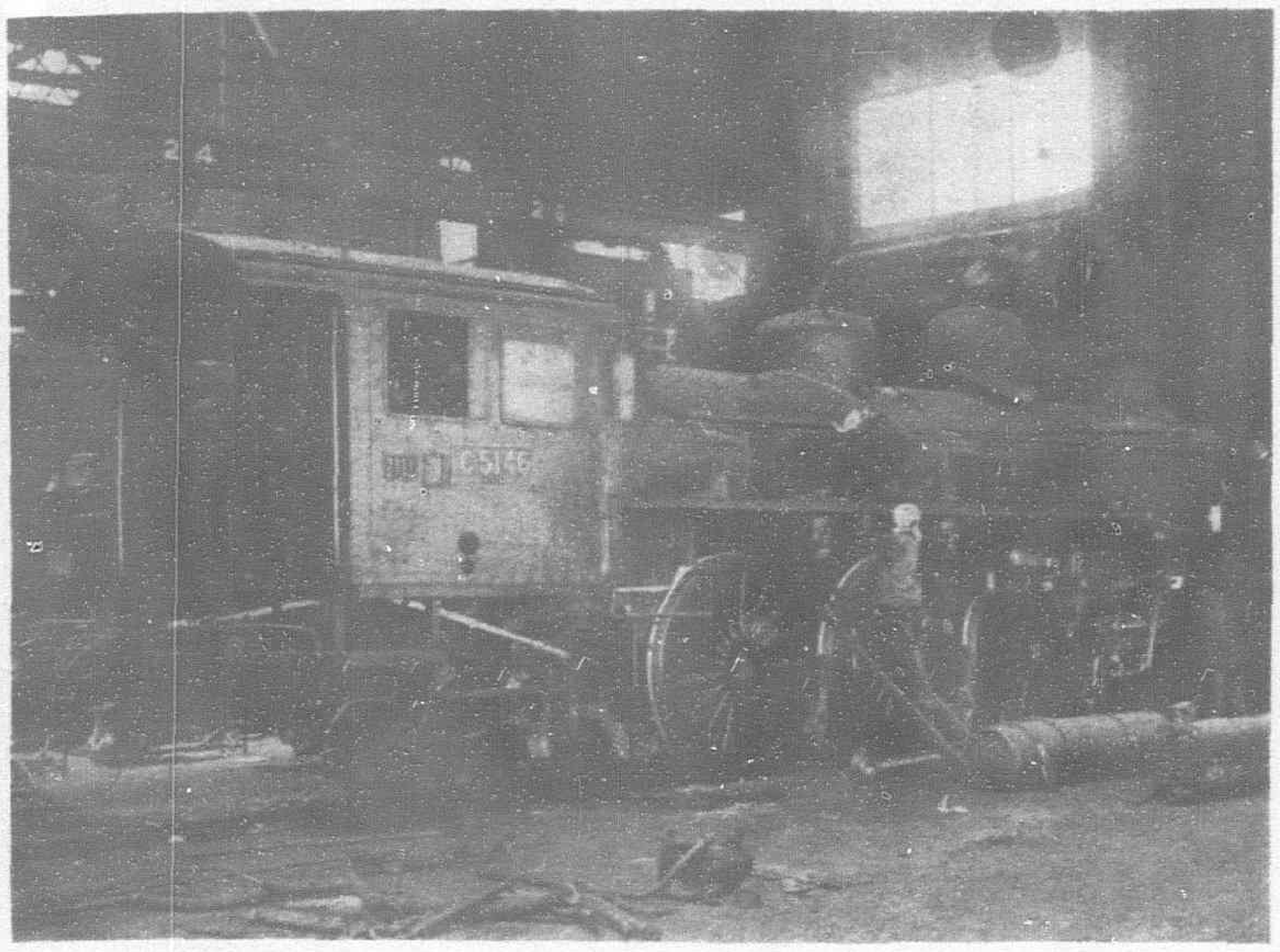
The Fourth Day; 3.00 p.m. Completion of the Mounting Boiler



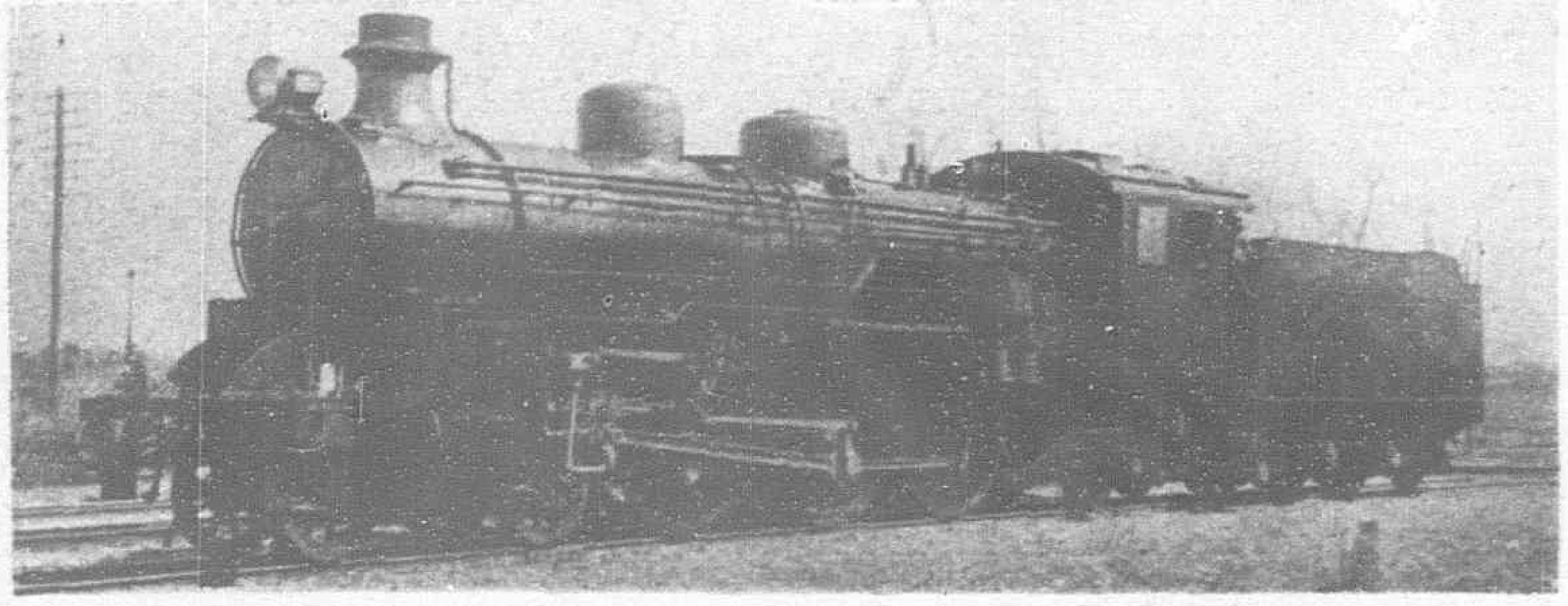
The Fourth Day; 3.30 p.m. Wheeling



The Fourth Day; 4.00 p.m. Completion of the Wheeling



The Fifth Day; 11.00 a.m. Assembling the Minor Parts



The Fifth Day; 3.00 p.m. Trial Running in the Works Yard

At the commencement of the work, washing of the smoke box and cleaning of the ash pan are done at a place outside the erecting shop, and then the locomotive is shifted to the stripping track and stripped, the inspection of its various parts being carried out simultaneously.

Those repair parts, which it is difficult to inspect because of their being covered with grease or dust, are washed in a soda bath.

Each stage of stripping will be seen in the accompanying pictures.

The assistant inspector registers the result of inspection for every main repair part on the locomotive repair card, which is made in quadruplicate. The assistant inspector keeps the original copy and the other three are sent to the erecting, boiler and machine shops, one to each.

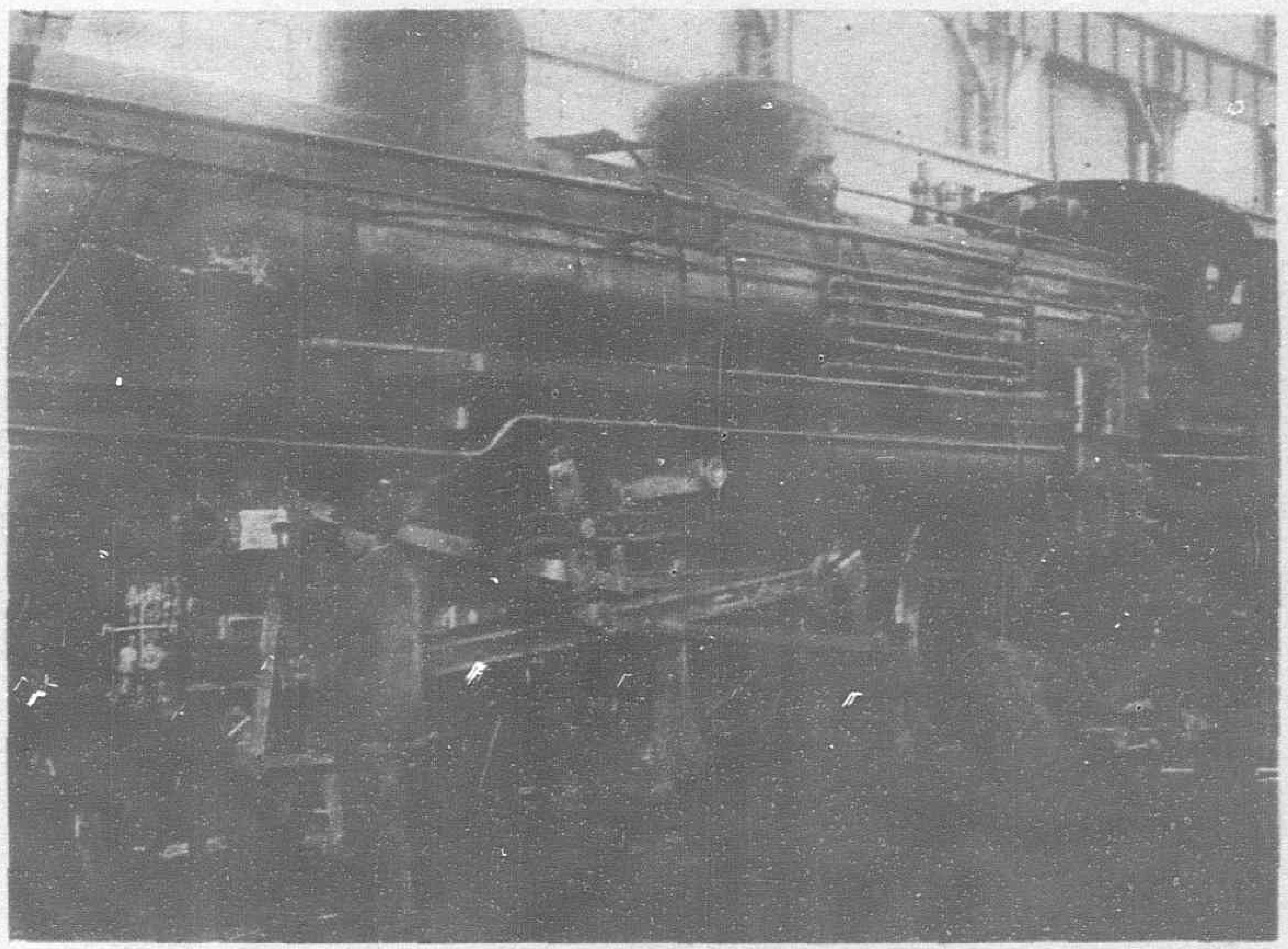
Receiving the repair card, the superintendent of the erecting shop makes an inquiry, issuing an inquiry card, of those shops which are to participate in the repair, through the related gangs of the erecting shop.

The inspection is generally done according to the stages of stripping. However, it follows the classification shown below:

1. Boiler
2. Boiler Mountings
3. Frames and their belongings
4. Wheels and Axles
5. Axle Boxes
6. Springs
7. Rods
8. Brake Rigging
9. Steam Cylinders
10. Valve Gears
11. Boiler lagging
12. Fire Grate
13. Mountings inside the Smokebox
14. Tubes
15. Draw and Draft Gears
16. Tender
17. Air Brake

Those parts mentioned below have certain specified repair and wear limits, which are known as the first and second limits in some countries.

The parts of which the wear and repair limits are specified are as follows:



The Fifth Day; 1.00 p.m. Valve Setting

1. Steam Cylinder
2. Piston and Piston Rod
3. Valve and Valve Spindle
4. Cross Head and Slide Bar
5. Connecting Rod and Coupling Rod
6. Crank Pin and Knuckle Pin
7. Wheel and Axle
8. Axle Box and Horn Block
9. Boiler
10. Boiler Mountings (Plug, Expansion Bracket, Regulator Valve etc.)
11. Spring
12. Valve Gear
13. Reversing Gear
14. Brake Gear
15. Frame
16. Water Injector
17. Lubricator
18. Automatic Coupler

4) *Number of workers classified according to the kind of work.*

The following table shows the number of workers of the erecting shop actually engaged in the repair work, classified according to the kind of work.

Kind of Work	*No. of Workers*	*Contents of Work*
Finishing of pipe and thin plate, excluding smoke tubes.	23	Water pipe, steam pipe and other small pipes, packing wires, thin plate works
Pipe arrangements, excluding tubes	6	Fixing of the above.
Repair and fixing of spark arrester and deflection plate.	3	Repair of deflection plate and its fixing, boiler lagging, repair and fixing of deflection plate.
Finishing and fixing of air brake pipe.	14	Finishing and fixing of air brake pipe.
Finishing of accessories for upper part of locom.	9	Scribing and finishing of accessories for upper part of locom, and arrangement of dismounted bolts.
Erection of the above.	16	Mounting boiler, attaching accessories inside the smoke box, fixing the intermediate draw bar, steaming and preparation for trial running, fixing the feed water pump, lagging, fire grate, ash pan and fixing of cab.
Wood working.	4	Wood working in general (flooring, etc.)
Finishing of special small articles.	7	Speed meter, repair and assemblage of pantagraph and its test, repair of air compressor.
Electric locomotive for the use of Abt system.	8	Repair and erection of the electric locomotive for the use of Abt system.
Electric locomotive, usual type.	13	Repair and erection of the electric locomotive of usual type.
Finishing of boiler mountings.	5	Finishing of such boiler mounting as safety valve, header for superheater tube, valves and cocks.
Testing and experiment.	7	Vacuum ejector, lubricator, injector, pressure gauge, vacuum gauge.
Hydraulic test.	12	Hydraulic test of boiler fittings.
Finishing of piston.	8	Centering of piston and cross head, reboring of steam cylinders, finishing of metallic packing, finishing of drain and by-path gears of steam cylinder.
Setting of piston.	9	Setting of cross head and adjusting of piston.
Finishing of valve.	8	Finishing of reversing screw and eccentric sheave, preparation for case hardening, finishing of air inlet valve and metallic packing, finishing of reversing shaft and union link, finishing of valves.
Fixing and setting of valves.	4	Fixing of valves and their setting.
		Scribing and finishing of axle box and

Kind of Work	*No. of Workers*	*Contents of Work*
Finishing of axle box.	18	horn block including those for tender, metallic lining, axle box wedges, adjusting of the crank pin angle.
Finishing of springs.	4	Finishing of spring gear.
Finishing of rods.	4	Finishing of connecting rods and coupling rods.
Wheel setting.	8	Fixing of axle box and spring, setting of wheels.
Tender.	5	Setting of wheels and fixing of couplers.
Overhauling.	24	Dismounting of boiler mountings and knocking down of all the parts, washing of repair parts and preparation for inspection.
Gas works.	11	Cutting with gas torch, gas welding and annealing.
Electric work.	4	Electric welding.
Brake gear.	8	Finishing and fixing of brake gear.
Pumps.	3	Repair of feed water pump and air compressor.
Finishing of air brake valve.	17	Finishing and fixing of air brake valves.

5) *Method of Repair and Progress of Work.*

The number of days required for general repair, according to the practice of the Omiya Works, ranges from three to six depending upon the grade of repair. However, as the average throughout our Government Railways' works happens to have been six days, each stage and method of six day repair will be described.

It takes the whole of the first day for stripping, inspection and transportation. During the next three days, *i.e.*, from the second to the fourth day, most of the repair work of each part is to be accomplished, and the boiler as well as every part by 3.00 p.m. on the fourth day. After 3.00 p.m. of the fourth day and during the forenoon of the fifth day, every part is assembled and the locomotive is erected as a whole. In the afternoon of the fifth day the trial running and retouching take place in the works. In the morning of the sixth day, trial running on the main line follows, and the locomotive is delivered to the round-house.

Whereas the distribution of workers, who are directly engaged in the repair work, is as shown before, the whole repair work is classified into 17 stages, and the boiler is repaired separately at the boiler shop.

From the table it will be seen that every stage of work is being done simultaneously, as mentioned before, and it will also be seen that the number of hours required for stripping on the first day and erecting on the fifth day, both of which are under the control of the erecting shop, is practically constant. Consequently it can be said that the main factor which governs the time required for locomotive repair is the heaviness of boiler repair. As the time required for boiler repair ranges from 1.5 to 4 days, the repair of parts other than the boiler may be done during this period, or the repair of parts other than the boiler of all the locomotives in the Works may be effected during the period keeping pace with the boiler repair.

The following is a detailed explanation of the method of locomotive repair.

1. Boiler. On the arrival of a locomotive to be repaired at the works, washing and cleaning take place, and the workmen of the boiler shop start to cut the smoke tubes, small ones with a tube cutter and large ones with a gas torch. Then the boiler is dismounted from the frame, when the tube cutting is entirely finished and the tubes are ready to be taken out. The number of new smoke tubes to be put in is previously estimated and prepared, based on the data sent by the round-house as well as the record of renewing, which shows the number of months that have passed since the last renewing and which is kept by the shop. Directly after being dismounted, the boiler is transferred to the boiler shop by a crane and truck.

In the boiler shop the smoke tubes are taken out, and at the same time an inspector inspects the boiler, and thus the parts and degree of repair are determined. Then the gangs for stay drilling, gas cutting of boiler plate and stripping etc. start their work at the same time.

After this is done, some pieces of boiler plate which were prepared in advance, are patched on by the gas welding gang. When this welding work is about to be finished, riveting, tapping and screwing in of stays etc. begin at the same time. On the other hand, repair of the tube plate is finished when the setting in place of all the tubes is started with certain spare material. And when the heading of stays and all the necessary caulking are about to be completed, the smoke tubes are almost settled in place. At 3.00 p.m. of the third day, when the boiler repair is nearly done, the fixing of boiler mountings is commenced, and in the afternoon of the fourth day the boiler is moved to the hydraulic pressure test plant for the pressure test. After having certain retouching the boiler is completely repaired by 3.00 p.m. of the fourth day, and this is absolutely necessary in order to have the trial running on the fifth day in the yard of Works.

2. Boiler Mountings. On the first day stripping and inspection take place, and the necessary inquiries are issued to the foundry smithy and other shops accordingly. The second day is spent in making the requisite castings and forgings, and the third day is mostly spent for machine and hand finishing of the castings as well as forgings, and they are about to be mounted on the boiler at 3:00 p.m on the same day.

3. Frame. On the first day the main and truck frames are stripped and inspected. If there is no defect found they are repainted on the second day. If there is any defect discovered, patching, re-riveting etc. are done by the workers of the boiler shop on the second and third days.

Repairing and fixing of horn block and horn stay are also done during these days.

4. Wheel and Axle. As a comparatively long time is required for this repair, wheel and axle must be stripped and inspected as soon as possible, and they must also be shifted to the machine shop for the necessary repair during the first day if possible. Re-turning shrinkage fit of tyre, press fit of axle and crank pin etc. are done in this shop. For the six day repair, the wheel and axle must be completed and sent back to the erecting shop by the forenoon of the fourth day.

5. Axle Box. As the box that requires the brass casting-in takes comparatively more time than other parts, it is necessary to send the box to the machine shop for rough turning on the first day without delay.

After the rough turning, the box is sent to the erecting shop for metal linings, and then it is sent to the machine shop again for the finish turning. These must be done by the time of completion of the wheel and axle.

6. Spring. After being dismounted, the springs are sent to the smithy shop where they are inspected and repaired. The springs and their accessories are completely repaired and sent to the machine shop for the necessary machining by the morning of the third day, and the machining is finished within that day.

The accessories, such as pin, bush etc., are taken from the stock, and case hardened and ground for proper use. These must also be done by the time of completion of the wheel and axle.

7. Rods. Cracked or worn out rods are machined after being repaired by gas, and new bushes are sometimes set in place. These must also be done by the time of completion of the wheel and axle.

8. Brake Arrangement. Forging, welding and gas repair of rods, as well as casting and machine finishing of brackets are to be finished during the third day.

9. Steam Cylinder. In this stage, re-boring of the steam cylinder, machining of the slide bar and metal lining of the cross-head shoe are done. The hand finishing at the erecting shop and machine finishing at the machine shop are done simultaneously.

10. Valve Gear. Gas welding of worn parts and their turning are done on the second day, and the third day is spent mostly in case hardening. In the morning of the fourth day, grinder finishing is completed.

Those tasks relating to boiler lagging, cab, fire grate, smoke box, tubes other than smoke tubes, draw gear, buffer, tender, air brake etc., do not take much time, unless there is any alteration work required, and these are easily completed by 3.00 p.m. of the fourth day. For the repair of those parts mentioned above, spare material is used as far as possible, otherwise the repairs might possibly take much more time.

These spare articles are either finished or semi-finished and are utilized as far as the condition allows. The dismounted articles, which have been replaced by the spare ones, are repaired and put in the stock as spare articles for use on another occasion, and thus the time required for the repair of a locomotive as a whole is reduced to a remarkable extent.

The spare article store belongs to the Works' store house, and, to ensure quick service it has branches at each shop. This is the same in the case of the passenger and freight cars.

Diesel Electric Locomotives and Rail Cars for Asiatic Railways

THE competition between road and rail transport which is causing much pessimism over the future of railways in America and Europe has also been instrumental in decreasing the revenues of many Far Eastern railways. The "Tin-Lizzie" or rattle-trap jitney that a few years ago carried its two, three or four passengers to work for a nickel, has grown to be a giant capable of carrying forty passengers, while trucks are becoming like locomotives with six or even eight wheels, travelling at 30 to 40 miles an hour, taking the traffic of whole districts away from the railroads at rates the latter can never meet, because of their capital investment. Auto-stages ply the highways from the Atlantic to the Pacific and we now have the luxurious night coach fitted with beds, lavatories and all the conveniences and comforts of Pullman travel, competing with the railway for long distance traffic. The railways create their own right of way and are subjected to strict governmental supervision and regulation as to rates, profits and service. Anybody can buy an automobile, bus or truck and start in business as a common carrier in competition with the railway under what is equivalent to a government subsidy providing him with a free right of way, roadbed and free maintenance. The railways which contribute a goodly share of national or state taxation actually help to subsidize this competing transportation system. Trucks and buses can pick up passengers and freight at any rate at any hour of the day and for any destination. There is no governmental obligation to maintain fixed rates or schedules or adhere to certain standards of service. The unfairness of the system is compelling railway executives in America to advocate that operators of road transport should bear a just share of the capital charge for the creation of their right of way and its maintenance by the state, and conform to the same regulations applied to the railways, in order to equalize the costs of road and rail transportation and do away with what constitutes an indirect subsidy.

In the last ten years the railways of the United States have lost 42 per cent of their passenger traffic to autos and planes and the situation is so serious that it is announced that an attempt will be made to recover some of this business by a sweeping reduction in passenger fares. Interstate Commerce Commission statistics disclose that in 1920 revenue passenger miles operated by the country's railroads totalled about 47,000,000,000, while the estimates for this year aggregate but 27,000,000,000.

The number of passengers carried 10 years ago was 1,235,000,000, while in 1929 the figure was only 730,468,000, with a further decline forecast for this year.

This compared with an increase in motor bus transportation from 4,797,000,000 passenger miles operated in inter-city service in 1926 to 6,797,000,000 last year, with a substantial increase looked for this year. In 1926 the number of passengers carried by buses running in inter-city service was about 255,000,000 while last year 422,000,000 preferred the bus to trains.

In the meantime, leading American railways, recognizing the public desire for highway transport have taken their own measures to meet this demand and at present over eighty railway companies operate bus lines in connection with their regular service. The tendency of railroading in America is towards creating a co-ordinated unit, operating on rails, on the highways, on the sea and when commercially sound, in the air.

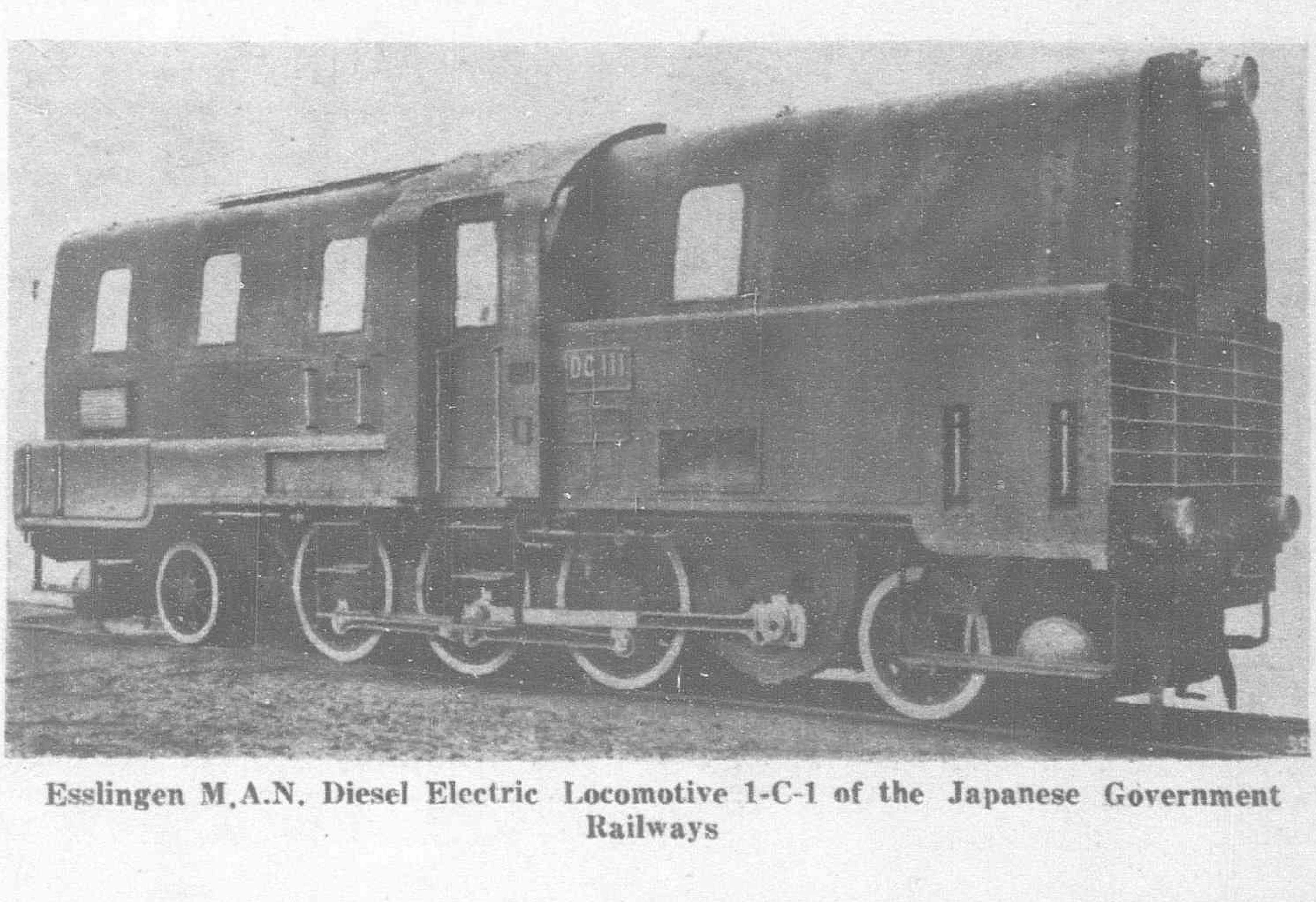
The possibilities for the rapid development of such a co-ordinated transportation system in the United States or other countries where private ownership of railways is the rule, are unlimited. In Far Eastern and Asiatic countries, private initiative has no opportunity to set the pace against government ownership and operation of railways and the tendency to monopolize all public utilities under state ownership and control.

The competition between road and rail in the Far East, wherever good roads have been built, has been as disastrous to the railway as in other countries. Especially is this true in countries like the Malay Peninsula, the Philippines and Japan, where the government has carried on for years a program of highway construction, in many instances practically paralleling the railway lines. Wherever this happens, the railway revenues suffer even when the rates are actually lower than the buses or lorries.

This intense competition has compelled the railways to adopt every device that will tend to lower the costs of operation, and as a result, the Diesel locomotive, Diesel electric locomotive, steam-cars, rail motor cars, and even regulation automobile buses fitted with steel wheels have been adopted on various lines. In this new power development on Asiatic Railways the Diesel electric locomotive has many qualities which opens for it an extensive use in certain regions. The Indian State Railways, Japanese Government Railways, Siam State Railways, and the South Manchurian System have purchased these types of locomotives from various European makers, in order to meet operating conditions peculiar to each line.

The improvement effected in the design of Diesel engines during recent years and their reliability as demonstrated under conditions of heavy duty, have opened up many possibilities for the employment of such units as a service of power in place of steam on locomotives. The incentive to seek an alternative to the steam locomotive is considerable, especially in localities where water is scarce or bad or where coal is expensive or of poor quality or where special conditions in terminal yards or for wharf use, call for absence of smoke, noise and danger of fires. Even where these conditions do not obtain to any extent, the normal maintenance and stand by charges of steam locomotives are sufficiently heavy to induce those responsible for their operation to investigate an alternative which shows itself likely to reduce these costs. The Diesel locomotive has a primary advantage in the high thermal efficiency of its prime mover. It has been found that its fuel consumption under average conditions is about one sixth that of a coal fired steam locomotive, so that with fuel oil at three times the price of locomotive coal, the fuel cost is halved. Furthermore, the Diesel locomotive incurs no stand by charges, as the engine may be shut-down whenever the locomotive is out of operation, even though this be only for a five minute halt at a station.

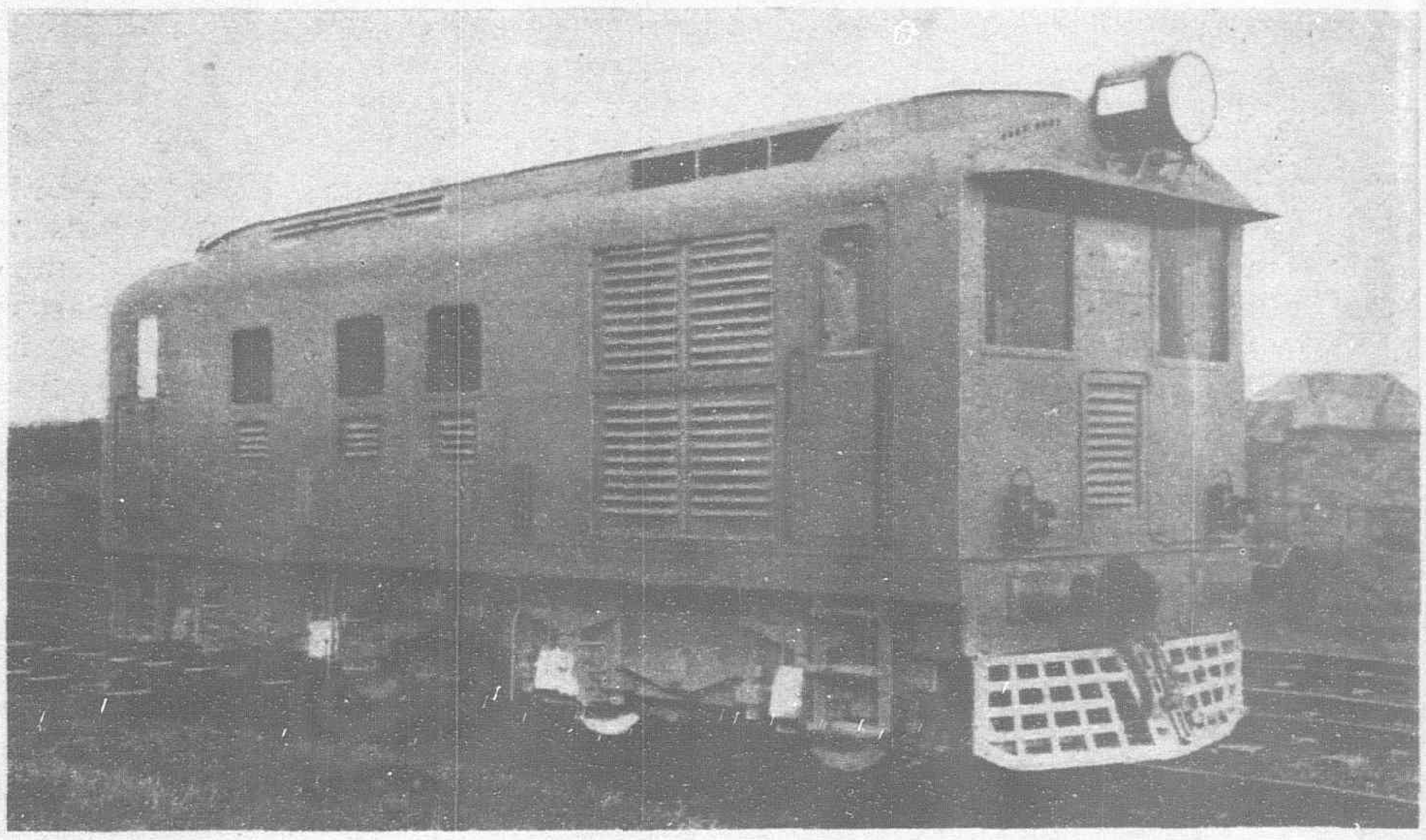
There is no fire box or boiler demanding regular attention and periodical repair. Moreover, fuel oil is more easily transported than coal, while a great advantage is that the Diesel locomotive can be prepared for service in a minute or two, whereas some considerable time must elapse before a steam locomotive is ready for duty. The Indian State Railway authorities seeking an alternative to the steam locomotive in districts where water is scarce or bad and coal expensive or of poor quality are now investigating the Diesel electric engine in order to reduce these costs and inconveniences.



Esslingen M.A.N. Diesel Electric Locomotive 1-C-1 of the Japanese Government Railways

Diesel Electric Locomotives for India

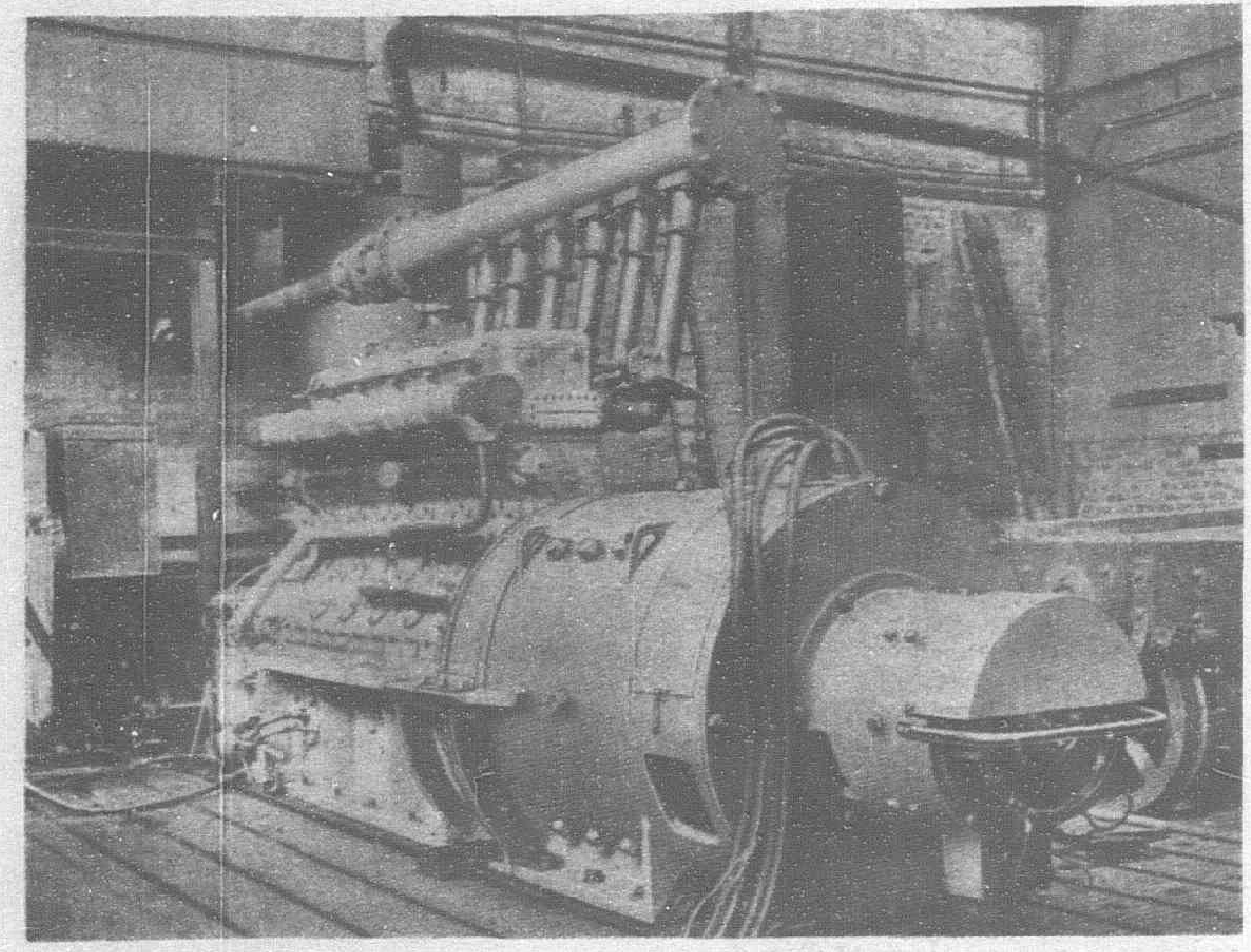
The General Electric Company, Ltd., of England, recently completed the trials of two Diesel electric locomotives for duty on short runs in the main and branch lines of the Northwestern Railway of India where they are to meet the steadily increasing competition from road transport. These locomotives are equipped with a high speed type six cylinder Diesel engine built by William Beardmore & Co., Ltd. These engines with a cylinder bore of 8¼ inches and a stroke of 12 inches, develops 350 h.p. The electrical equipment is constructed in accordance with the Oerlikon system.



General Electric Co., Ltd., 350 h.p. Diesel Electric Locomotive for the India State Railways

Diesel Electric Locomotives for Siam

The Siamese State Railways, because of the lack of coal in the country, the necessity of firing most of its steam locomotives with wood over long distance runs with frequent changes of locomotives, investigated various methods of improving its service and reducing operating costs. Complete electrification was considered, but had to be rejected as too expensive. Two straight Diesel meter guage locomotives were ordered in 1927 from the Swiss Locomotive and Machine Works, for shunting and local small train service in connection with the scheme for electrification of the near traffic. Their capacity is 200 b.h.p. with oil operated mechanical transmission gear. In their trial tests over the Rhetian Railway in Switzerland before shipment, an extremely low fuel consumption was recorded and since they have been in active operation in Siam, this low record has been maintained. The Siamese State Railway last annual report states that "although it is too early to testify as to cost of upkeep, it is not anticipated that this will in any way exceed the normal maintenance cost of steam locomotives."

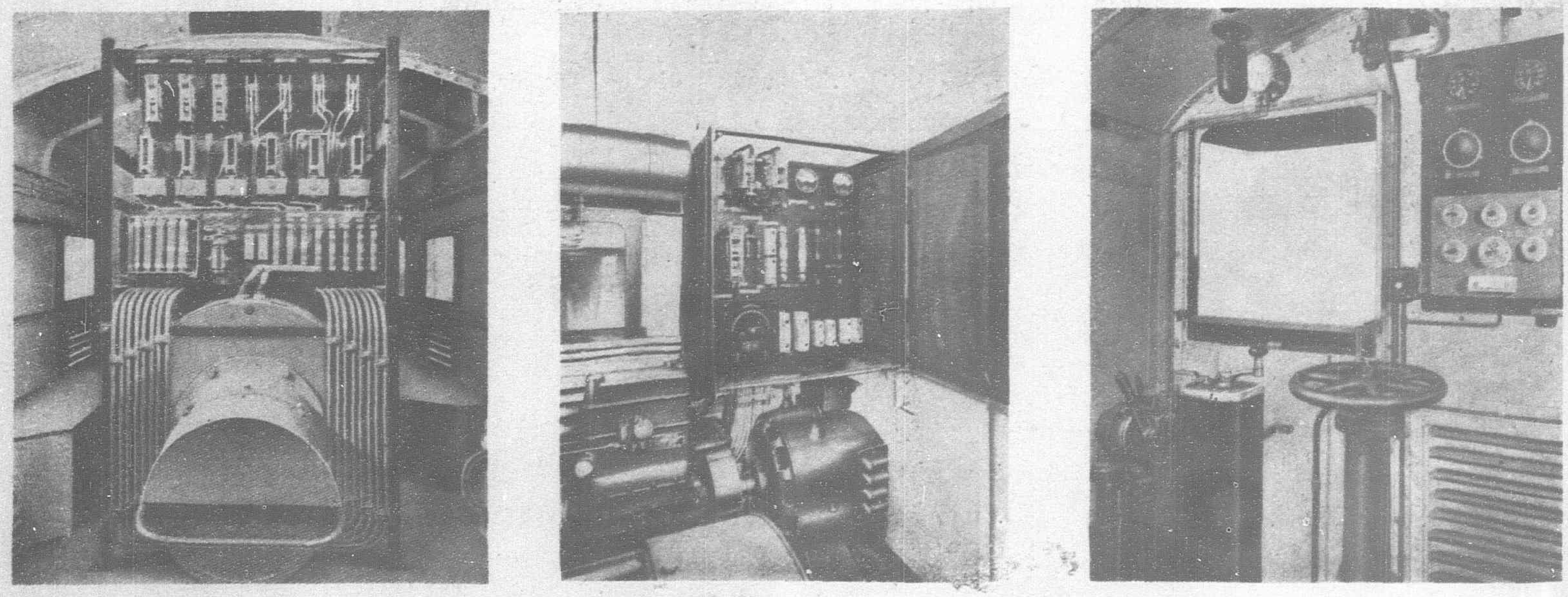


Power Unit of (G. E. Ltd.) 350 h.p. Diesel Electric Locomotive Erected on Test Bed

The general arrangement of the locomotive shown in Fig. 1. (page 4). The vertical 6-cylinder Diesel engine located inside the cab works on the four stroke cycle with solid fuel injection. There are five selective speeds. All controls and apparatus of the driver's cab (Fig. 2 page 4) are arranged for operation by one move only, and are double, right and left hand side.

Since 1928, the Siam State Railways have ordered 19 Diesel electric locomotives from Switzerland and Denmark:

One 1,400 h.p. Frichs articulated 4,800 : 0-8-4 with two generating sets, eight traction motors, weight 124 tons, radius



G. E. Ltd. 350 h.p. Diesel Electric Locomotive for Indian State Railways

View Inside Center Compartment, Showing Main Control Panel Mounted Over Generator

Five k.w. Petrol Engine Driven Auxiliary Generator and Control Panel

Driver's Controls and Indicating Instruments in One of Driving Compartments of activity 1,000 kilometers. Six 900 h.p. Frichs 4-8-4, two generating sets, four traction motors: approximate weight 86 tons: radius of activity, 1,800 kilometers. Six 400 h.p. Sulzer Brothers, two bogies, four drawing axles, two carrying axles, one generating set, weight 60 tons. Six 200 h.p. Frichs railcars.

The cost of operating Diesel rail cars as compared with steam service varies somewhat with the service. Two Sulzer Diesel rail cars operated in the Appenzell Railway, Switzerland, over a period of 268 days for both cars, each running 200 kilometers per day showed the following results:—

Cost of Steam Service

268 days by 220 km—58,960 km by 45 cts.	= Sw. Frs.	26,532.00
1 man extra for the service 266 by Frs. 17	= ,, ,,	4,556.00
	Sw. Frs.	31,068.00

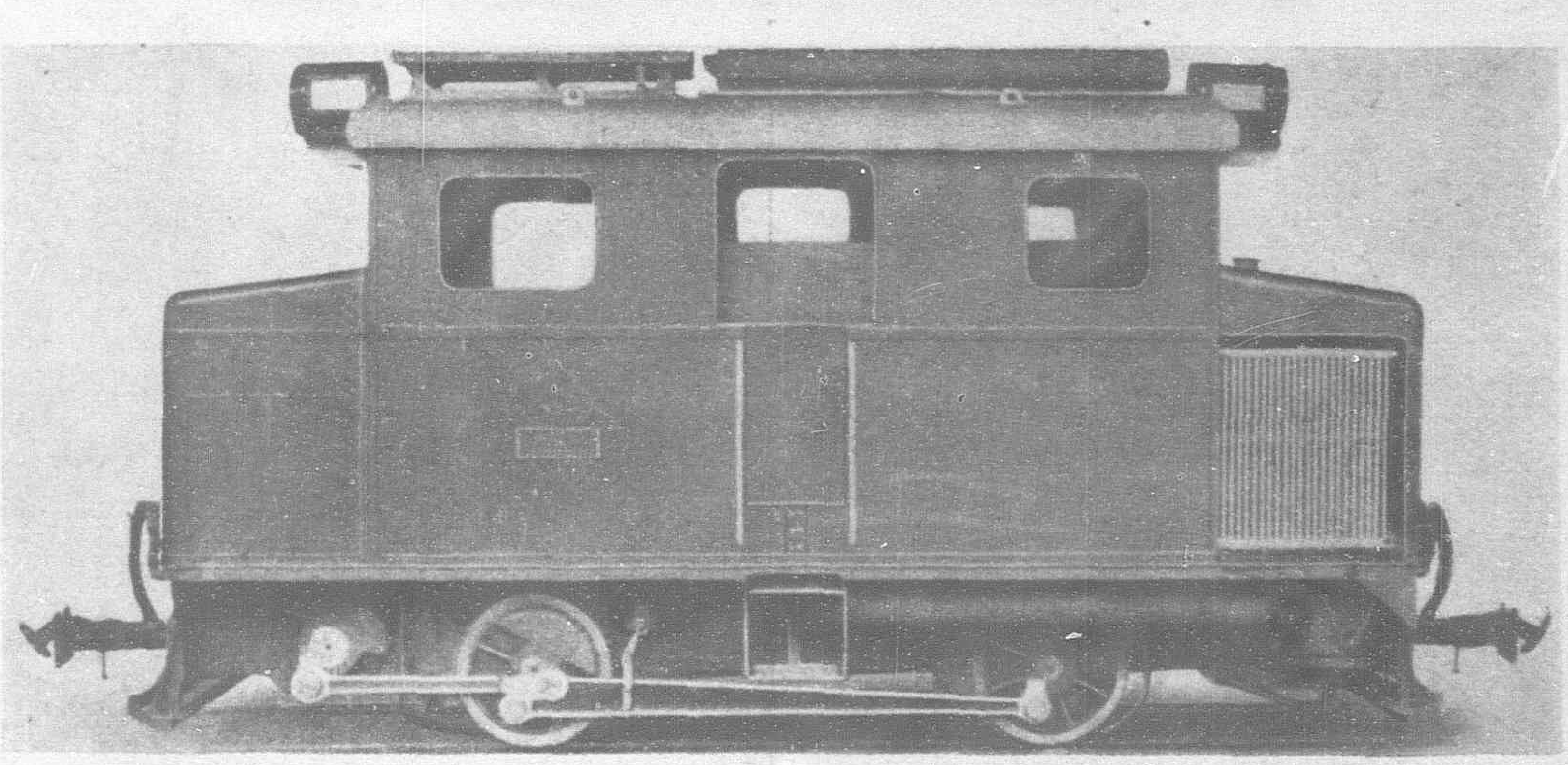
Cost of Diesel Rail Car Service

268 days by 220 km—58,960 km by 10.2 cts.	= Sw. Frs.	6,014.00
Extra expenses for steam service	= Sw. Frs.	25,074.00

From these figures it is seen that the Appenzell railway, by adopting the Sulzer rail cars, reduced the bare working expenses to about 20 per cent of the expenses for steam service. In addition to that it is said that the rail cars prove more economical than had been assumed when the project was first accepted, for they enable the number of trains to be increased, and because of this some of the passenger traffic of a rival railway has been captured by the Appenzell railway.

The six Sulzer Diesel electric locomotives for the Siamese State Railways are to be used for mixed traffic and also for shunting. Each locomotive is equipped with a 400 b.h.p. single-acting eight-cylinder Sulzer four cycle Diesel engine, direct coupled to a D.C. dynamo, which supplies current to four driving motors mounted in tram suspension on both the outer axles of the two six-wheeled bogies. The fuel consumption is low and the consumption of water practically nil, advantages which allow trains to be hauled over the longest runs in Siam without changing the locomotives.

S.L.M. DIESEL LOCOMOTIVE FOR ROYAL STATE RAILWAYS OF SIAM



Diesel Locomotive Built for the Royal State Railways of Siam, and Fitted with Oil Operated Mechanical Transmission Gear

Gauge	3-ft. 3-3/8-in.	Max. tractive effort	11,000 lbs.
Diam. on Tread of Drivers	2-ft. 9-7/16-in.	Light weight	49,000 ,,
Wheel base	9-ft. 2-1/4-in.	Weight in working order	51,800 ,,
Motor power	200 b.h.p.	Speeds 4.35, 8.1, 12.4, 17.4, 25 m. p. h,	
Motor speed	300/500 r.p.m.		

Diesel Electric Locomotive for the S.M.R.

Last year, the South Manchuria Railway Company ordered from Sulzer Brothers a 750 b.h.p. Diesel electric shunting locomotive to be used in the Dairen yards and wharves. Sulzer Brothers, carried out very satisfactory tests with this locomotive on the Swiss Government Railway Line between Winterthur and Romanshorn during last November. The locomotive can pull 1,800 tons at a speed of 25 km. per hour and can develop a speed up to 65 km. per hour when the load is correspondingly reduced. When making the trial run, up to 14 cars were trailed by the above locomotive. This locomotive shown in Fig. 3, page 4 having two bogies is, therefore, very flexible in the curves.

The locomotive is fitted with a Sulzer 8-cylinder Diesel engine with airless injection, capable of developing momentarily an output of 850 b.h.p. This engine has been tested with Tarakan oil and it has proved that this high speed engine, even with this thick oil, runs in every respect satisfactorily.

The output of the engine is first transmitted to a generator which generates the necessary current for the four driving electric motors which are fixed on the bogies. The locomotive can be handled by one man only as the cooling water circulation, the lubrication of the engine and the conveying of the fuel oil to the engine are entirely automatic.

The locomotive has a driver's cabin at both ends. The Diesel engine is mounted in the middle of the car body. The mechanical parts have been made by the Schweiz Industrie Gesellschaft in Neuhausen and the electric parts by the Maschinenfabrik Oerlikon, so that the whole locomotive is entirely Swiss made.

Fig. No. 4 shows the interior of the locomotive and Fig. No. 5 shows one of the driver's cabin.

The running costs of such a locomotive are very small as the Diesel engine is the most economical engine which can be found at present.

The possibility to stop the Diesel engine from the driver's cabin and to put it again in service within a few seconds results in a further economy of running costs. When running down hill or when the locomotive is at standstill, the engine is stopped and, therefore, does not consume any fuel during this period.

Diesel Rail Cars for S.M.R.

Besides this locomotive, the S.M.R. Co. have ordered from Messrs. Sulzer Brothers two Diesel rail cars, each of 250 h.p. which will be used for carrying passengers. Each car has a seating capacity for 60 passengers and fitted with a 250 b.h.p. Sulzer

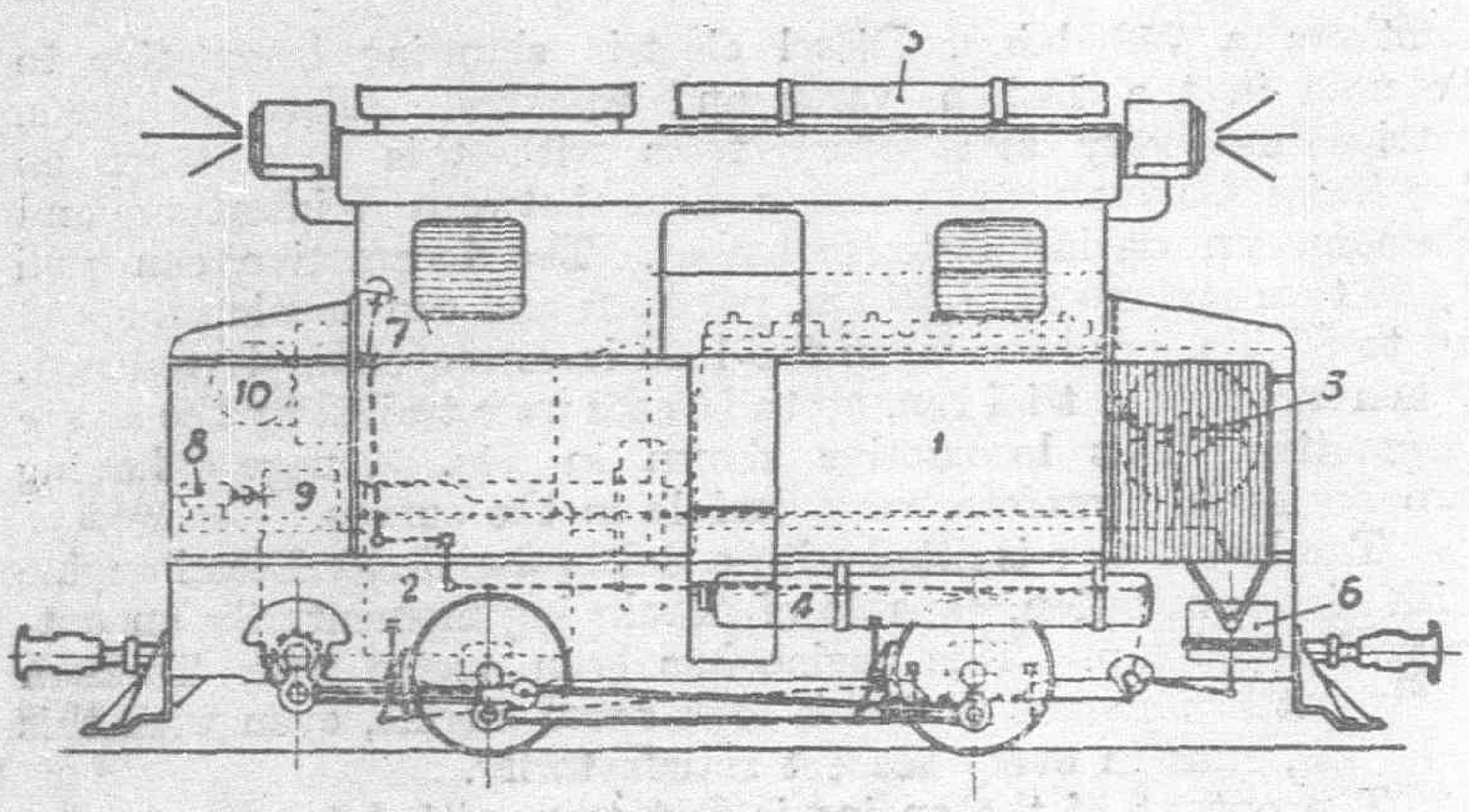


Fig. 1.—S.W.4 Diesel Locomotive 200 b.h.p.

(1) Engine
(2) Transmission gear
(3) Cooler and fans
(4) Starting air bottles
(5) Exhaust-silencer
(6) Vacuum brake cylinder
(7) Hand brake
(8) Lighting set
(9) Vacuum pump
(10) Vacuum receivers

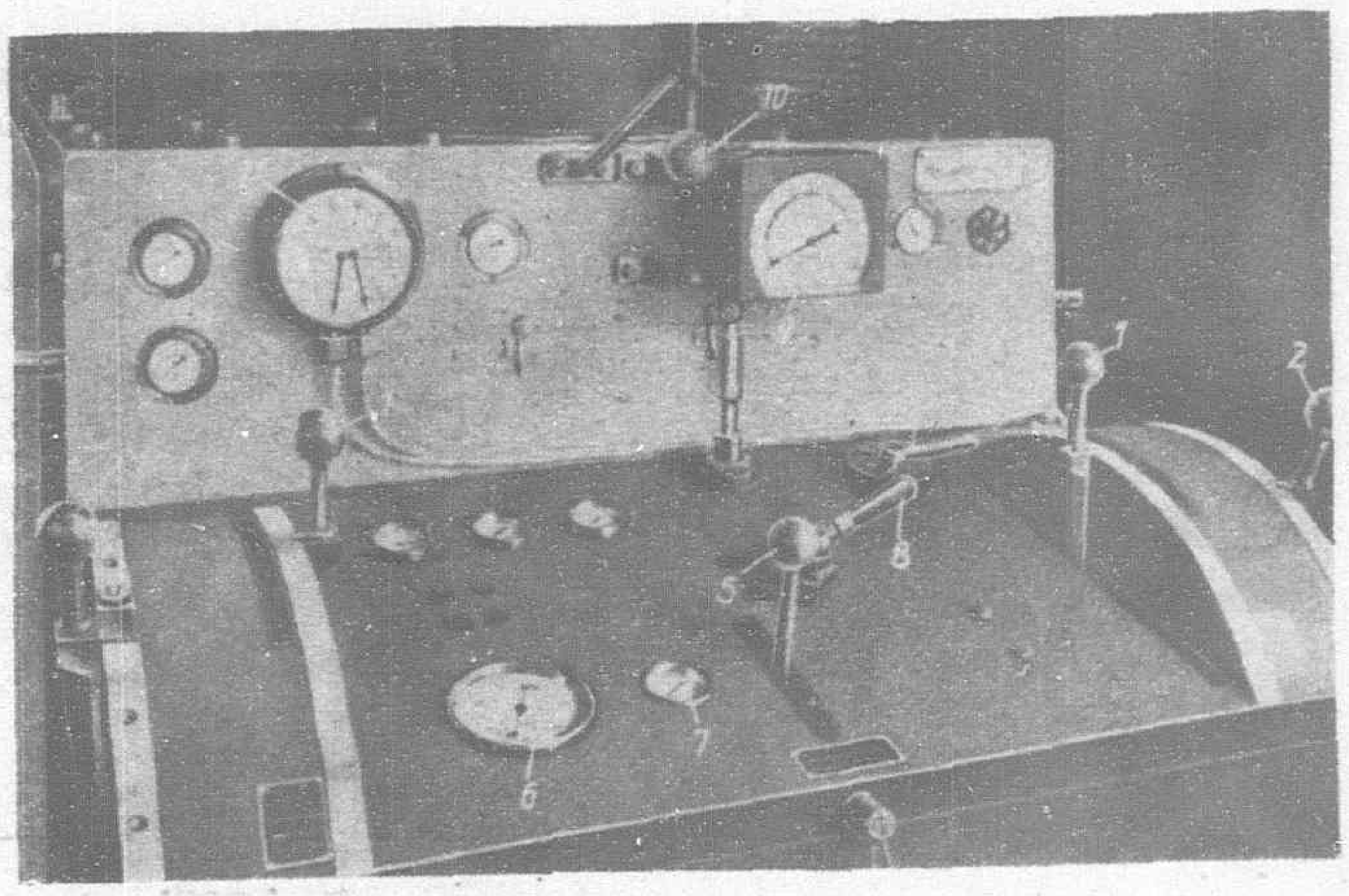


Fig. 2.—Driver's Desk of the Diesel Locomotive

(1) Fuel regulation
(2) Control of oil operated mechanical transmission gear
(3) Fuel cock
(4) Valve for regulating the air pressure of the fuel tank
(5) Reverse gear
(6) Tachometer
(7) Cooling water thermometer
(8) Sander
(9) Speed indicator
(10) Whistle
(11) Duplex vacuum gauge

Diesel engine. The car bodies will be made at the S.M.R. workshops, whereas the Diesel engine, electric parts and bogies will be supplied through Sulzer Brothers who act as general contractor. These rail cars are to be delivered in March.

In addition to the two Sulzer Diesel rail cars, purchased by the S.M.R., thirteen similar cars are to be put in service on the line this spring. It is also proposed to build 17 more Diesel rail cars during the next fiscal year to be increased later by an additional nineteen or 36, all told. Some of these cars will accommodate 100 passengers and others only fifty, for short passenger hauls from the larger cities of Dairen, Mukden, Changchun and Antung.

It is the intention of the railway authorities to have all these new cars in service by 1933. Each 100 seater car is estimated to cost Y.25,000. All the passenger traffic between Dairen and Port Arthur will be handled by these rail cars, releasing the locomotives for other services. The car bodies will be built at the Shakako Works of the S.M.R. near Dairen.

The operation of these Diesel rail cars on the S.M.R. follows the adoption of similar cars on many Japanese government and private railways, who have felt the pinch of bus competition. Nearly every railway line in Japan has been deprived of a large part of its passenger traffic by the ever increasing extension of automotive transportation, and as a counter measure have adopted the gasoline motor driven rail cars in order to reduce expenses.

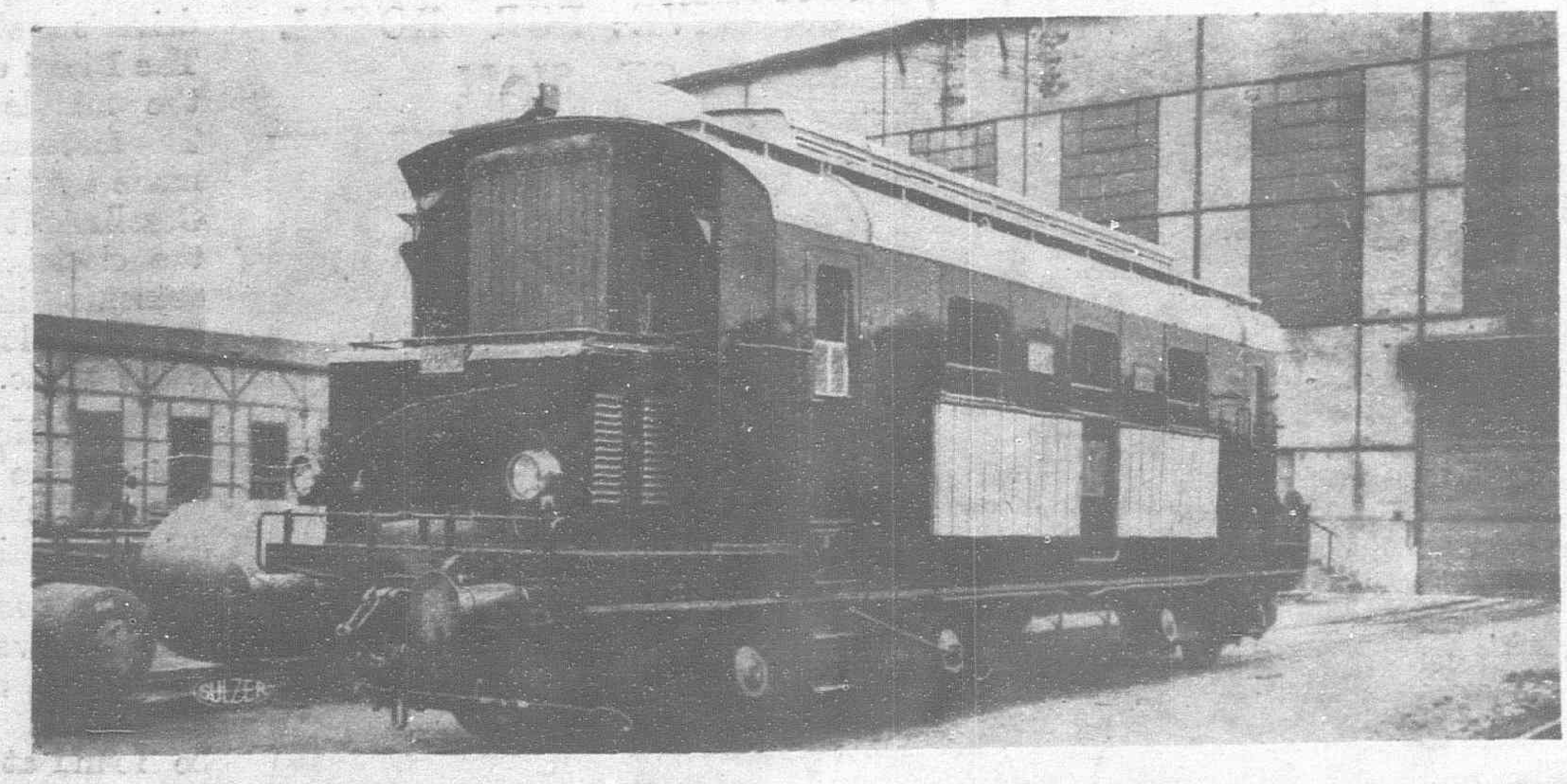


Fig. 3.—750 b.h.p. Sulzer Diesel Electric Shunting Locomotive for the S.M.R.

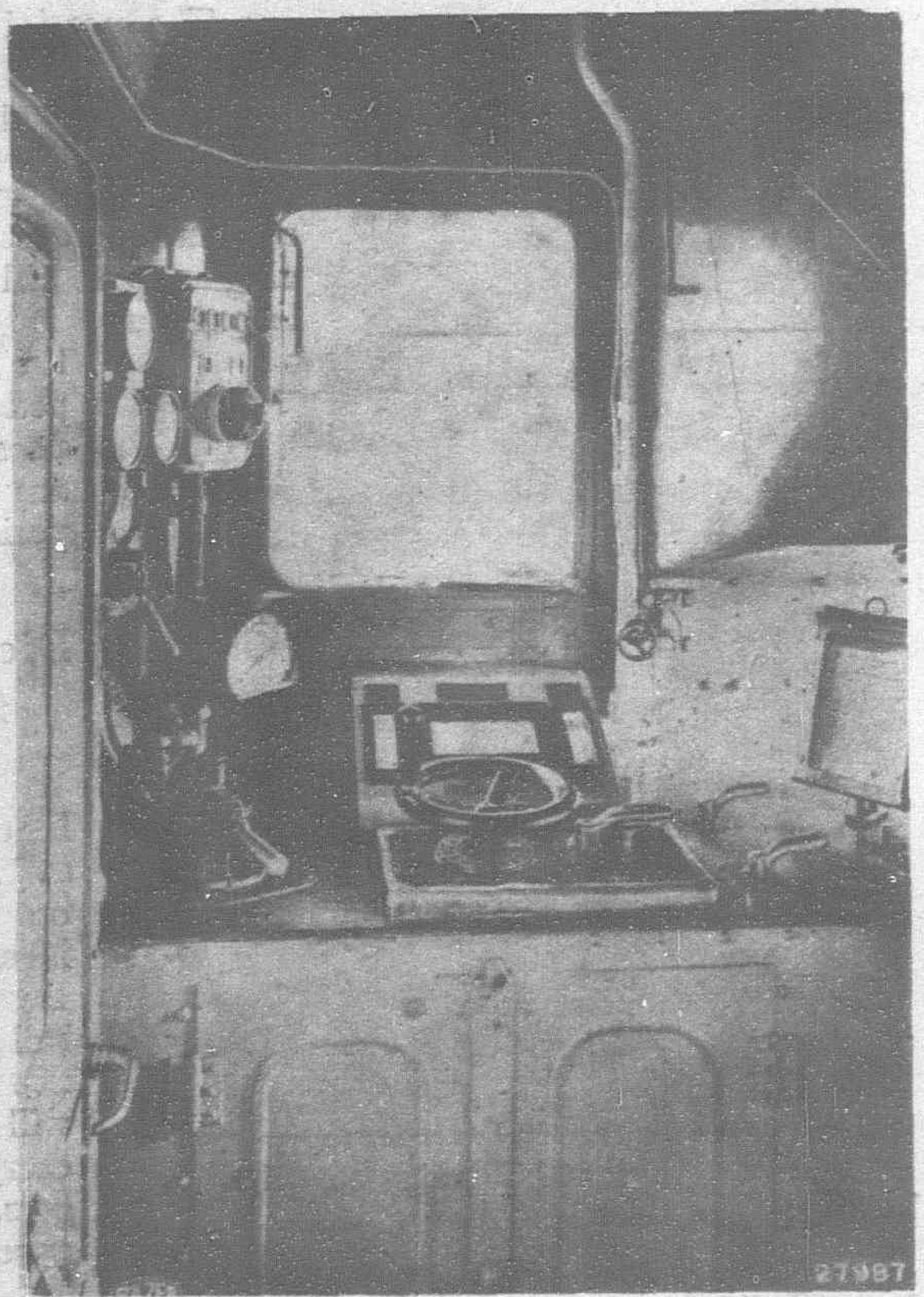


Fig. 5.—Driver's Cabin

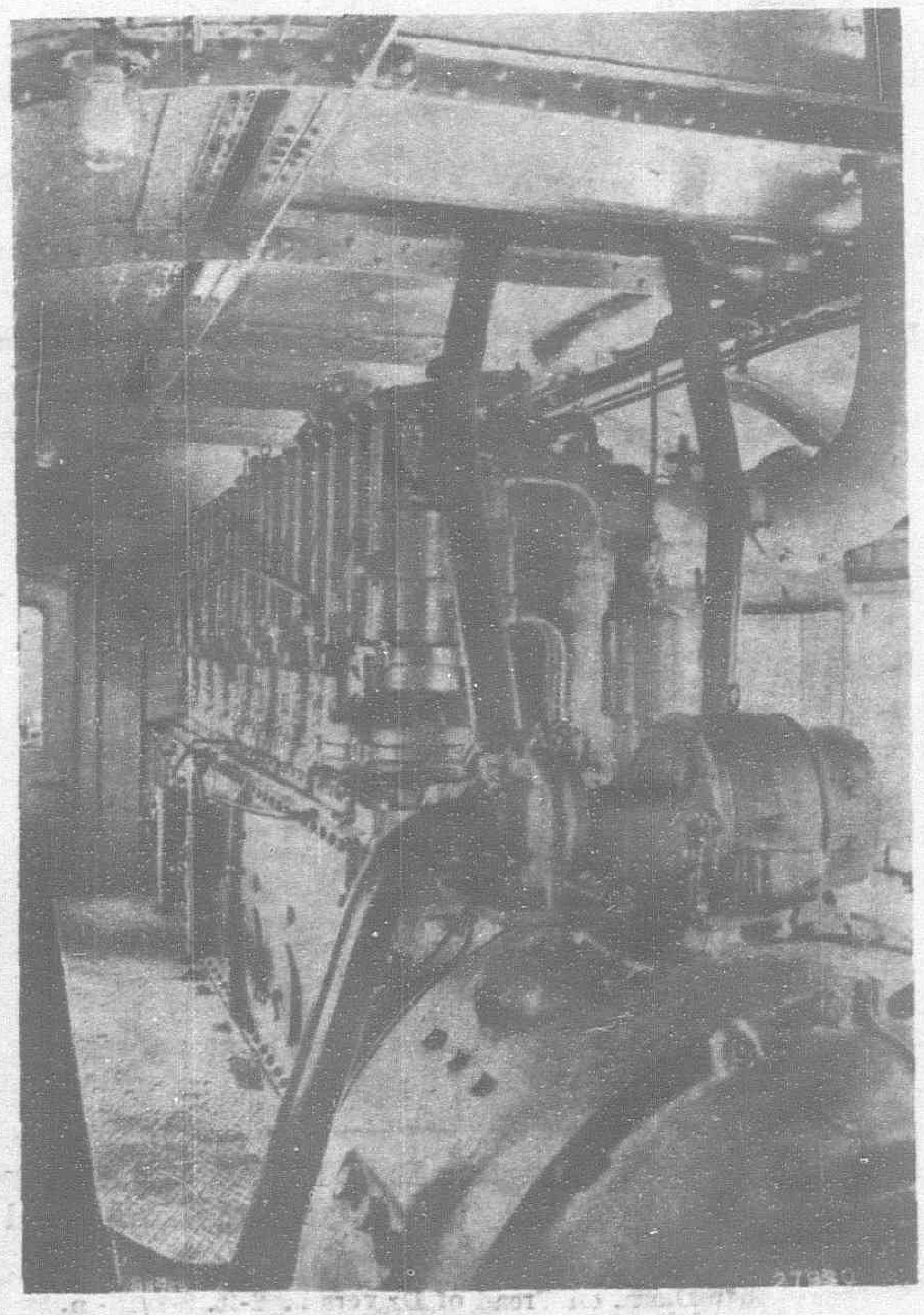
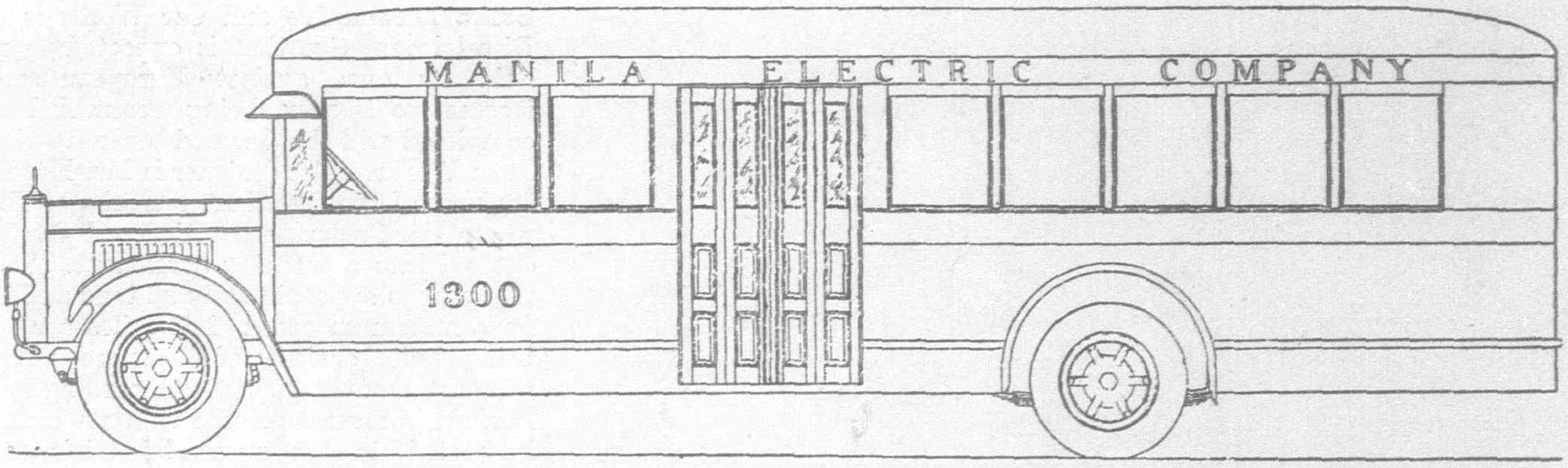


Fig. 4.—750 b.h.p. Diesel Engine



New Bus Lines in Manila Will Use Large Bus Body Built on Mercedes-Benz Diesel Chassis

Gasoline Cars on Japanese Railways

During 1929, thirteen private Japanese railways adopted gasoline cars and other lines are rapidly following their lead. The Japanese Government Railway Department are operating many rail cars, equipped with American motors, in which the Ford, Buda and Wisconsin types prevail. The tendency, however, towards using home-made material will eventually hand over this business to Japanese motor manufacturers, whose products are being extensively used in all other lines. The Ikegai Iron Works of Tokyo, the Tokyo Gas and Electric Company, the Kobe Steel Works and the Niigata Iron Works specialize in the smaller Diesel engine units. The Ikegai Iron Works have supplied several 40 h.p. motors to the Government Railways for rail car propulsion. Every effort is being made in Japanese engineering circles to produce an engine suitable for these operating conditions. In the meantime, orders are being placed in America and Europe for rail car engines. The following table gives the particulars of some of these cars now in operation in Japan and Chosen.

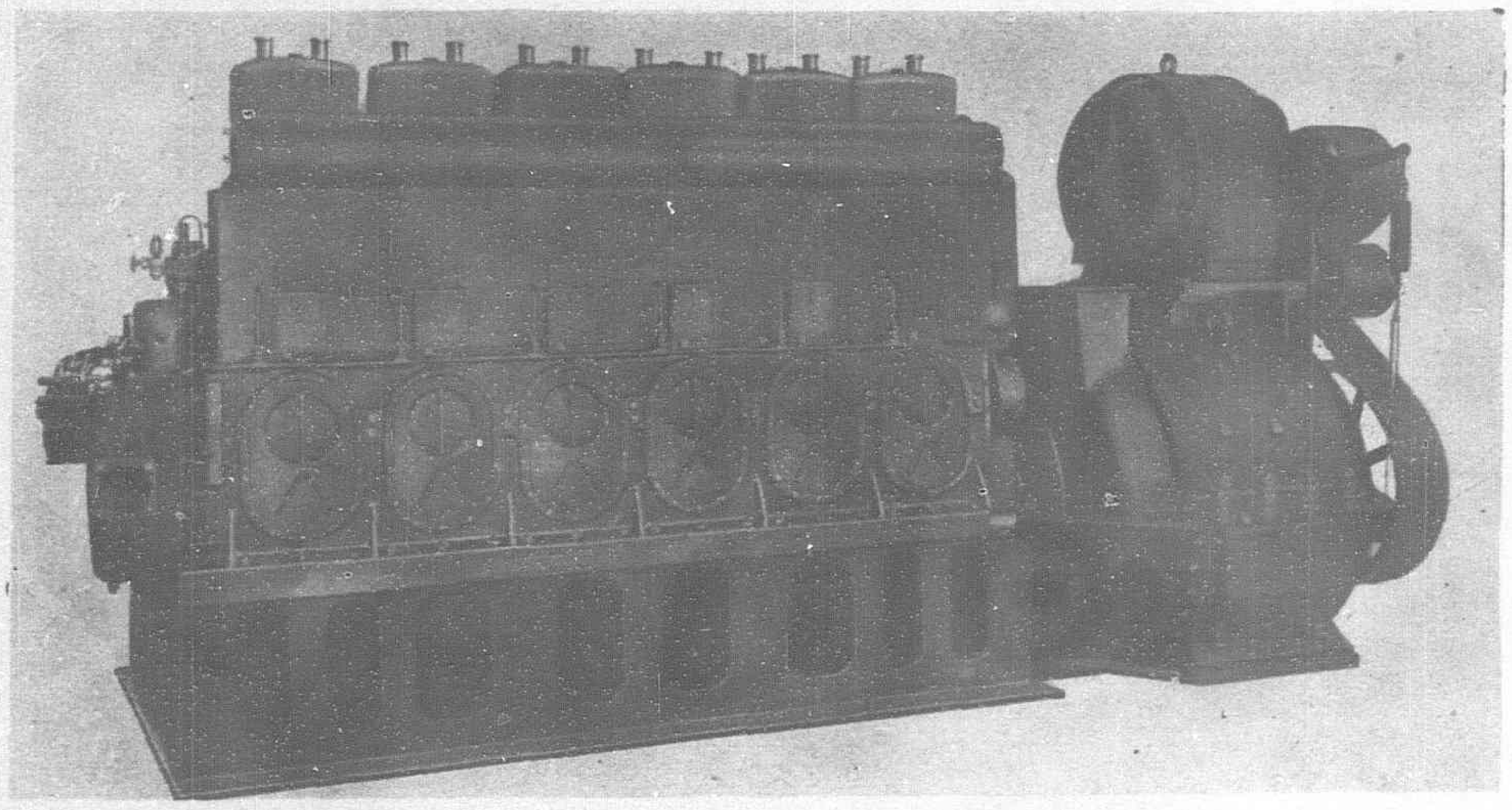
Esslingen M.A.N. Diesel Electric Locomotive for the S.M.R.

In addition to the Sulzer Diesel Electric Locomotives ordered for the S.M.R. the company has placed an order with the Maschinenfabrik Esslingen for a similar locomotive equipped with a M.A.N. Diesel engine. This locomotive is a Bo+Bo 700 h.p. type, driven by a M.A.N. light weight, high-speed Diesel engine working on the 4-cycle principle, single acting, having an output of 700 h.p. at 700 r.p.m. The complete locomotive data is as follows:

Diesel Cylinder, diam. and stroke	280/380 mm.
Normal output	700 h.p.
Maximum ,,	750 ,,
Voltage in Main Circuit	700 v.
Generator output	435 kw.
Voltage in the auxiliary circuit	150 v.
Exciter output	68 kw.
Four Traction Motors, each	100 kw.
Gear ratio	1:5,06
Maximum tractive effort	17,000 kg.
One Hour tractive effort at 17 km/hr.	7,000 kg.
Continuous tractive effort at 25 km/h.	5,600 kg.
Maximum speed	60 km/h.
Overall length	11,200 mm.
,, width	3,210 ,,
,, height	4,660 ,,
Diameter of Wheels	1,120 ,,
Bogie Wheel Base	2,400 ,,
Distance between center pins of truck	5,500 ,,

GASOLINE CARS ON JAPANESE RAILWAYS

User	Keinan Railway Co.	Chosen Railway Bureau	Nagaoka Railway Co.	Jap. Govt. Rys.	Shantung Railway	Chosen Railway Co.
Builder	Japan Rolling Stock Mfg. Co.	Maruyama Rolling Stock Mfg. Co.	Amemiya Works	Nippon Sharyo	Maruyama Rolling Stock Mfg. Co.	Japan Rolling Stock Mfg. Co.
Gauge	4'-8½"	4'-8½"	3'-6"	3'-6"	3'-6"	2'-6"
Kind of Engine	Waukesha 6-SRL	Waukesha 6-RB	M.A.N. W 4B 11/18	Ikegai	Waukesha 6-KU	Waukesha 6-XK
H.P. of Engine	60 h.p. at 1,200 r.p.m. 75 h.p. at 1,500 r.p.m.	2-100 h.p. at 1,200 r.p.m. 2-115 h.p. 1,500 r.p.m.	50 h.p. at 1,100 r.p.m.	40 h.p. at 1,200 r.p.m.	54 h.p. at 1,200 r.p.m. 80 h.p. at 2,000 r.p.m.	42 h.p. at 1,200 r.p.m. 50 h.p. at 1,500 r.p.m.
Side of Operator	Both end	Both end	Both end	Both end	Both end	Both end
Wt. of Car in empty (K.T.)	12.95	20	20	18	6.8	7
Wt. of Car in working order H.P. per ton of car	5	5	2.5	2.2	8	6
Wt. of car per H.P.	200 kg.	200 kg.	400 kg.	450 kg.	126 kg.	167 kg.
Length of car body	9200	17070	11900	9000	27'-6" (8380 mm.)	34'-5" (11430 mm.)
Width of car body	2940	2600	2440	2800	8'-0" (2450 mm.)	7'-0" (2130 mm.)
Height of car body	2300	3840	3880	....	11'-9⅛" (3590 mm.)	10'-6" (3200 mm.)
Seat Capacity seat	37 cross	50 parallel	32 parallel	34 cross	20 parallel	48 cross
stand	8	50	38	9	20	10
total	45	100	70	43	40	58
Baggage Compartment	4' × 9'	No.	No.	....	No.	No.
Kind of truck	4-wheel	Bogie	Bogie	4-wheel	4-wheel	Bogie
Speed	32 km/h at grad 1/66 average speed 48 km/h	Max. 64 km/h	48 km/h at level	50 km/h at level 19 km/h at .25 grade	Max. 42 km/h	Engine 1,400 r.p.m. 38.5 km/h
Kind of brake	Hand, air brake	Hand, air brake	Hand brake	Air brake	Hand brake	Hand brake
Dia. of wheel	34"	34"	34"	860 mm.	34"	28"
Journal bearing	Roller bearing	....	....	....	....	Roller bearing
Tank capacity	20 gallon	30 gallon	4 cub. ft.	....	20 gallon	20 gallon
Car body	Semi-steel	Semi-steel	Semi-steel	Semi-steel	Semi-steel	semi-Steel
Heater	Exhaust of engine	No.	....	cooling water	No.	Exhaust of engine
Toilet	Yes	No.	No.	....	No.	No.
Price	Y.18,250	Y.38,300	Y.20,000	Y.15,000	Y. 8,500	....
	....	....	....	Y. 8,600	....	....
	....	....	....	Y. 6,400	....	....



M.A.N. Power Plant on Diesel Locomotive for the Japanese Government Railways

Light weight	70.4 tons
Weight in working order	73.6 ,,
Fuel oil	1,450 kg.
Lubricating oil	300 ,,
Cooling water	880 ,,
Sand	300 ,,

Diesel Electric Locomotive 1-C-1 of the I.J.R.

On page 1 is shown the illustration of the Esslingen-M.A.N. Diesel electric locomotive delivered to the Japanese Government Railways. This is driven by an M.A.N. high-speed Diesel engine of 600 b.h.p. at 700 r.p.m. The Diesel engine itself, is of the solid injection, 4-cycle, single acting type, built with due consideration to ease of operation and considerable saving in weight. Due to the last point, a special base plate has been omitted. Frame and cylinder block are cast in one, forming one rigid and stiff unit. The crank case is closed oil tight at the bottom merely by means of a sheet metal cover. The lower halves of the bearings are held in place by steel tie-rods, which reach from the top of the cylinders down to the cross girders of the crank case, and are designed to take up all stresses in the cylinders and casting, resulting from compression and combustion. During the erection of the engine, these tie-rods are installed with an initial stress, so that all tensions upon the casting are taken up by these rods and the engine itself is entirely free from all stresses due to combustion and compression.

Cylinder lines are inter-changeable and may be installed and dismantled very easily. Intake and exhaust valves are operated by push-rods and overhead levers. The cam shaft is placed within the crank case. The engine starts very easily and immediately from cold, without the use of preheating or igniting devices, simply by means of compressed air.

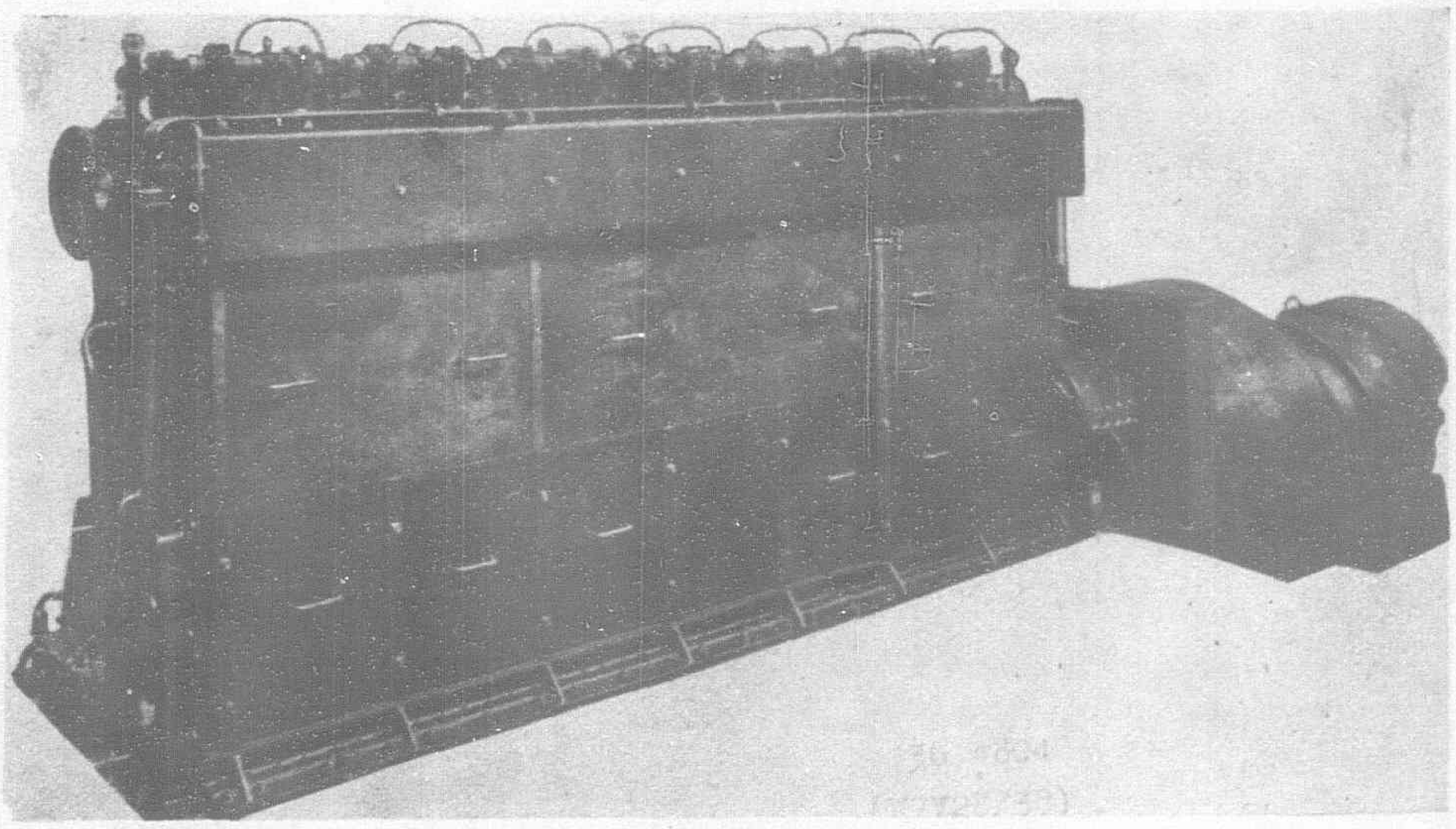
Japanese Build Diesel Locomotives

It was only a question of time before the Japanese tried their hand at turning out Diesel locomotives. The *Osaka Mainichi* states that the Osaka Locomotive and Car Works is building a Diesel locomotive that is expected to more than hold its own against European makes. The locomotive is now being assembled and when completed will be handed over to the Yawata Steel Works. The designer is Mr. Kato, technical engineer of the Ikegai Iron Works of Tokyo, with whom the Osaka Locomotive and Car Works has entered into a working agreement. The locomotive weighs approximately 22 tons and is designed for a maximum speed of 40 miles per hour. It is being built entirely of Japanese materials and will cost about Y.80,000. According to the *Osaka Mainichi*, several private railway companies are interested in the successful trials of the new locomotive with the object of placing orders with home manufacturers.

Diesel Engined Street Buses for Manila

Another important advance in transportation is being carried out by the Manila Electric Railway & Light Company, who are supplementing their electric traction service by the use of Diesel engine buses on their suburban routes. Space does not permit of a detailed history of the street railway system in Manila and its environs, but it is sufficient to say that after twenty-five years, the "Meralco" operates over 55 miles on track on many routes radiating from the heart of the city. The company is now operating 133 electric motor cars, in addition to these regular street cars, they are operating eight trackless trolleys. In 1927, the company entered the bus business and to-day operate 85 units over 52 miles of route, serving as extensions to rail lines cross town lines in Manila and others radiating from the business section of the city.

In the immediate future the "Meralco" will place in operation a large bus unit body built on the Mercedes-Benz Diesel bus chassis to carry 62 passengers. This application of the Diesel engine using fuel oil for passenger bus operation is an innovation in Far Eastern transportation, but it has been successfully tried out in Europe and America. These experiments in Manila will be watched with great interest by all other transportation companies in the Orient, as any system that will reduce operating costs is bound to be enthusiastically welcomed.



M.A.N. Power Plant on Diesel Electric Locomotive for the S.M.R.

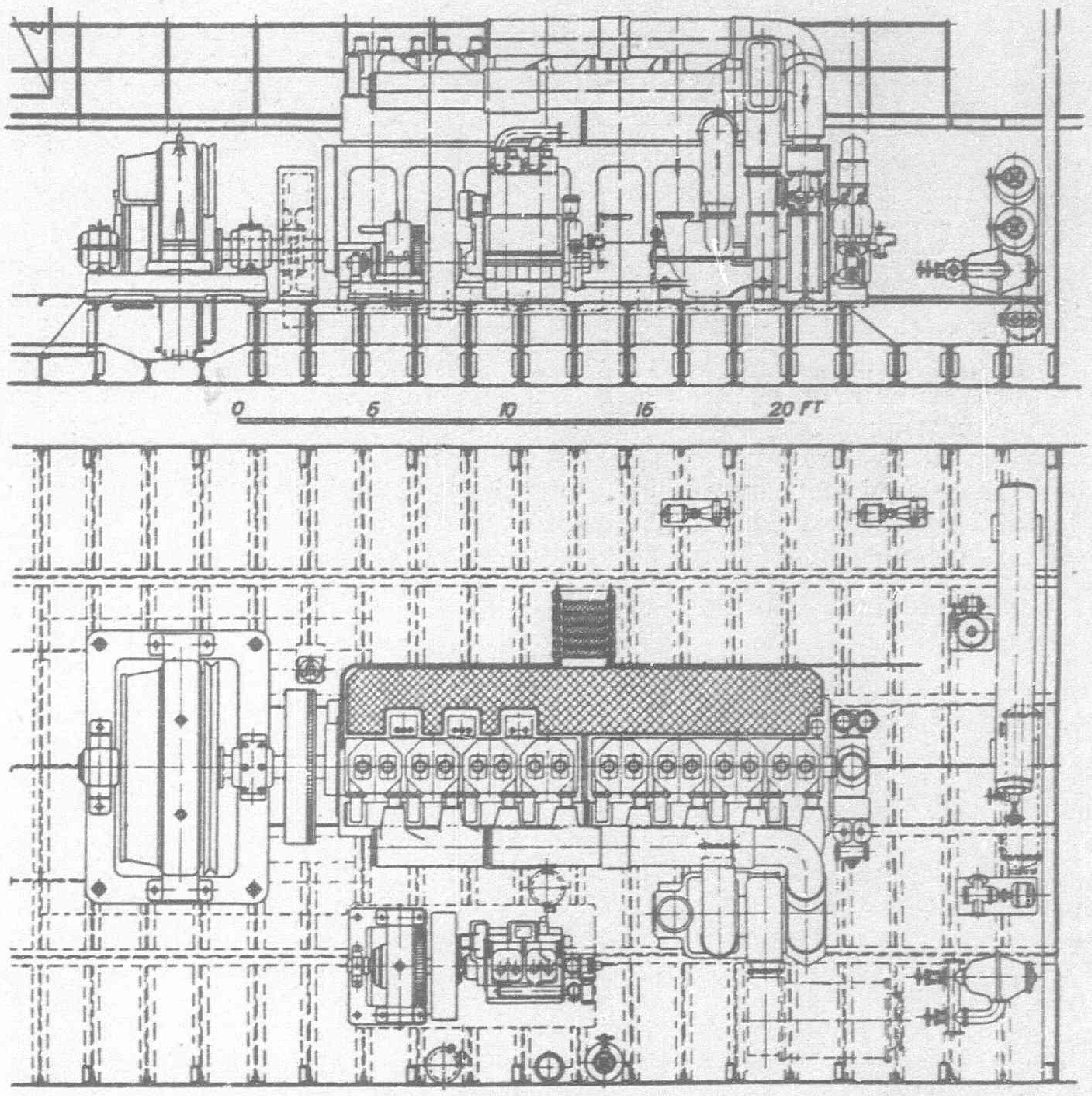
Praya East Reclamation Projection, Hongkong

At the meeting of the Legislative Council on February 7, the final report was submitted on the Praya East Reclamation which has added approximately 3,789,000 square feet to the area of the Colony and which is now being rapidly built over.

The report goes exhaustively into the cost factor and explains why the original estimate of cost to the holders of rights ($1.505 per square foot) became at the end $2.41 per square foot. As is well-known, the increase was due to the unexpected amount of rock encountered in Morrison Hill, whence the filling material came. Despite the greater cost, the scheme was in every way a profitable undertaking.

The reclamation was made at a total cost of Hkg. $3,383,620.

Diesel Electric Dredger for Tokyo Bay



General Arrangement of Machinery for Diesel-Electric Dredger.

The application of the well known Buchi system of turbo-charging to passenger and cargo motorships has increased to a great extent during the past year or so. One of the most novel applications is to the machinery installation of a Diesel electric dredger for Japan.

The order for this machinery has been placed with the Swiss Locomotive & Machine Works, Winterthur through the Nichizui Trading Company, and consists of an airless injection Buchi turbo-charged Diesel engine of Swiss Locomotive design for Tokyowan Umetate K.K., of Tokyo. The dredger is for service in Tokyo Bay, and the accompanying drawing gives an impression of the general arrangement of the engine room of this interesting craft. The main engine has eight cylinders with a bore of 390 mm., a stroke of 520 mm., and an output of 1,200 b.h.p. at 300 r.p.m. is obtained.

A Japanese-made generator having an output of 850 kw. is directly connected to the engine. Generator and engine are not placed on a common bedplate, but rest on a rigid steel foundation. The main generator supplies current to the dredging pump motor as well as for the drive of the cutter and the various winches. A two-cylinder 60 b.h.p. airless-injection auxiliary Diesel engine, also of S.L.M.-Winterthur type, is directly connected to a 40-kw. generator, which is provided for auxiliary duty. This auxiliary engine runs at a speed of 500 r.p.m., the cylinders having a bore of 230 mm. and a stroke of 300 mm.

Both main and auxiliary engines have attached starting air compressors, cooling water pumps, and bilge pumps, as well as a rotary type lubricating oil pump. Cooling water is drawn from the sea and passed through a suitable filter, which keeps sand and mud from the engines, and then circulates through the jackets and so overboard. A regulating valve on the cooling water pumps maintains a constant pressure in the system. The main engine does not require piston cooling, thus greatly simplifying the design and the piping arrangement. Lubricating oil drains are located at both ends of the main engine bedplate and connected through a large pipe which leads to the oil strainer, such a drain arrangement not depending upon the engine being in a level position.

From the strainer the oil is drawn through the lubricating oil pump, which forces it through another filter and a large oil cooler before passing to the engine. The same system is applied to the auxiliary engine. A mechanical lubricator driven off the engine camshaft serves for the cylinder lubrication.

On the port side beside the main engine the Buchi exhaust turbo-blower set is located at floor level, this being of Brown-Boveri manufacture. The exhaust gases from four cylinders are carried separately to the turbine. One outlet pipe leads the exhaust to a silencer which at the same time is designed to serve as a boiler for fresh water in order always to have an ample supply of warm water for sanitary purposes. A by-pass in the exhaust pipe allows the exhaust gases to flow directly to the exhaust boiler without passing through the turbine should the necessity arise. To compensate for heat expansion, special expansion pieces are installed in the exhaust line. The blower draws scavenging air through a silencer on deck and delivers it to the engine. The lubricating oil for the exhaust turbo-blower is taken from the pressure line of the main engine and the used oil is also drained to the strainer of the main engine.

Fuel oil is carried in large tanks on the port and starboard sides of the vessel. A hand pump is used to fill the daily service tank, which contains a filter. A small paraffin tank is also provided. Three air bottles, two of 400 litres and one of 200 litres capacity, contain the necessary starting air for the main and auxiliary engines and are connected together.

A feature of the installation is the exceptionally low engine weight, which is only 75 lbs. per b.h.p.

Shimonoseki Strait Bridge Project

The business men of Kyushu are evidently tired of waiting for the Government Railway engineers to solve the problem of providing direct rail connection with the main island by means of the much discussed tunnel under the strait between Shimonoseki and Moji and are now advocating the construction of a bridge.

A group of influential personages in Kyushu, including President Ohtaguro of the Kyushu Tramway Company and President Asoh of the Kyushu Hydro-Electricity Co., have proposed a plan to construct a suspension bridge across the Channel and have applied to the Fukuoka Prefectural Government for permission to proceed with the project.

According to the plan, a railway company with a capital of Y.30,000,000, is to be established at Kokura to span the Channel by a bridge to be built between Wakamekari Head on the Shimonoseki side and Hinode on the Moji side, a distance of 3,000 feet. It is to be 200 feet above the sea-level and to be double-bridged. The upper bridge is for a double track railway and the lower for tramcars and ordinary traffic.

New Police and Fire Station at Tientsin

The new police and fire station at Tientsin is perhaps one of the most up-to-date structures of its kind in the Far East. Indeed, it would be no exaggeration to say that those who are engaged in police and fire-fighting duties in many parts of the world might well envy the personnel, both foreign and Chinese, of the Tientsin Police and Fire Brigade for the generous accommodation which has been provided for them in their new quarters.

Situated at the corner of London Road and Creek Road in the British Municipal Extra-Mural Extension and backing on to the British Municipal Council new pumping station and reservoir on Douglas Road, this building was erected at a cost of nearly Tls. 180,000. Fulfilling dual purposes, the building is similar in construction to the new Chinese school in that the walls are of brick and the floors of concrete. The flat concrete roofs are insulated against heat; a feature which will be greatly appreciated by the staff during the hot summer months.

The multi-colored brick facings were manufactured by the Kailan Mining Administration, and the dressings round the windows, at quoins, string courses etc., are of light red brick. The windows are of steel and the keystones and window cills are of Peking stone.

As a safeguard against fire there are external concrete stairs and verandahs to all rooms. The blocks of this building are built on the external boundaries of the site; thereby forming a courtyard for drill and other purposes. The total area of the site is 7.600 mow, which had to be raised some five feet in order to bring it to the level of the adjoining Municipal road.

An idea of the accommodation can be gauged by the following information supplied by Mr. J. W. Williamson, F. R. I. B. A., the Municipal architect who designed the buildings, the heating arrangements and the hot and cold water service. Mr. Williamson also designed the fire service, drainage and plumbing system.

The building possesses a full size gymnasium which will be fitted with all the latest gymnastic equipment. There will also be dog kennels, observation kennels and a coolies' room. In addition their is a mess room with a kitchen and wash-up. A schoolroom has also been provided.

The living quarters consist of 13 barrack rooms each to sleep 24 men in double deck bunks (312 men); each bunk being supplied with steel lockers. One barrack room has been allotted to the sixteen Russian policemen, who have a separate lavatory accommodation. There is also a separate barrack room for 16 firemen with a sliding pole running direct to the engine below. In addition to this accommodation there is a barrack room for sixteen coolies.

A garage is able to house five motor-cars with ample room for stores. A novel feature of the architect's plans for this type of building is the provision of a lavatory block which includes a number of shower baths for the convenience of the men. Sergeants' lavatories are separate.

The archives room is situated over the main entrance.

In so far as the administrative requirements of the building are concerned, there is a large general office, a guard room, private offices for the foreign officer and the senior Chinese officer with lavatory attached. The cells, both for male and female prisoners, have a lavatory system.

A sick bay for minor cases has been provided consisting of eight beds and a dispensary. Baths and lavatory accommodation complete this necessary feature of a structure such as this.

The distribution of accommodation in the Fire Department is equally as up-to-date as that provided for the police. The fire engine room in addition to opening on to the road also has direct access to the courtyard for the purpose of engine and escape practice, hosing down, etc. There is a duty room, office, store, petrol store and a hose drying tower.

The quarters for the chief foreign officer consists of a drawing room, dining room, study, four bedrooms, bathroom, kitchen and usual offices, whilst the two quarters for the junior Chinese officers consist of living room, four bedrooms, bath room, kitchen and offices which are so constructed that they have access to the flat roof. Nor have the quarters for the senior Chinese officer been overlooked for his accommodation resembles that provided for the chief foreign officer.

The whole building will be heated by hot water radiators with the central boiler house as the main source of supply, but the domestic hot water supply to showers, washing tubs, sinks and basins will be provided from an independent steam boiler in the central boiler house, from which the steam is taken to calorifiers situated in convenient positions in the five feet clearance underground where the floor provides access to all piping and feed to the various fittings direct from the calorifiers.

The electric lighting supply is being installed by the Electricity Department of the British Municipal Council.

The reinforced concrete work has been designed by the Municipal Engineer, Mr. H. F. Barnes, B. SC., M. E. I. C. The whole of the work was carried out by the Public Works Department to the architect's designs under the supervision of the Council's Clerk of Works, Mr. Caldwell.

New School Building

The first unit of the new buildings to house the Tientsin Kung Hsueh completed by the British Municipal Council at a cost of approximately Taels 80,000 and which occupies the site facing the new Kung Hsueh Road, was formally taken over by the School Committee last September.

The Kung Hsueh at present occupies the former premises of the Tientsin Grammar School on Recreation Road as well as the new unit on Kung Hsueh Road. As funds become available it is the intention of the Council to erect further buildings adjoining the one just completed.

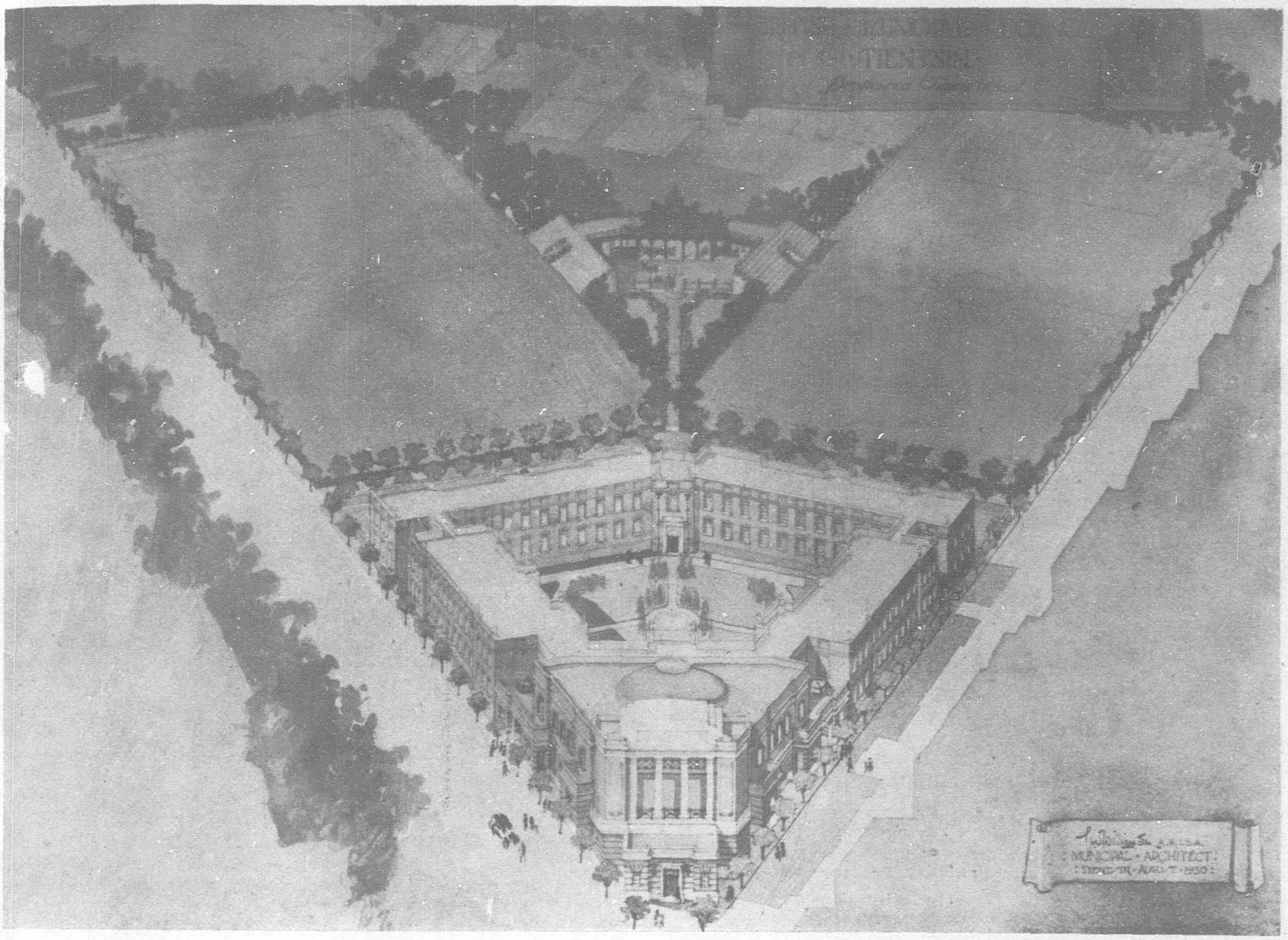
The entire block will occupy the apex of the site known as the old Reservoir site which is bounded by Elgin Avenue, Bristow Road and the newly completed Kung Hsueh Road. The school is designed to accommodate 1,200 pupils and will, when completed, consist of five blocks of buildings grouped around a center quadrangle. Four will be school buildings proper each of them self contained and furnishing accommodation for 300 pupils. The block just finished and now occupied by the school is the boy's senior section and probably the next work to be completed will be a corresponding block on Elgin Avenue for the girls' senior section. At the rear and connecting the two senior blocks will be the Junior school houses while the assembly hall which will be situated at the extreme apex will complete the triangle and connect the entire school.

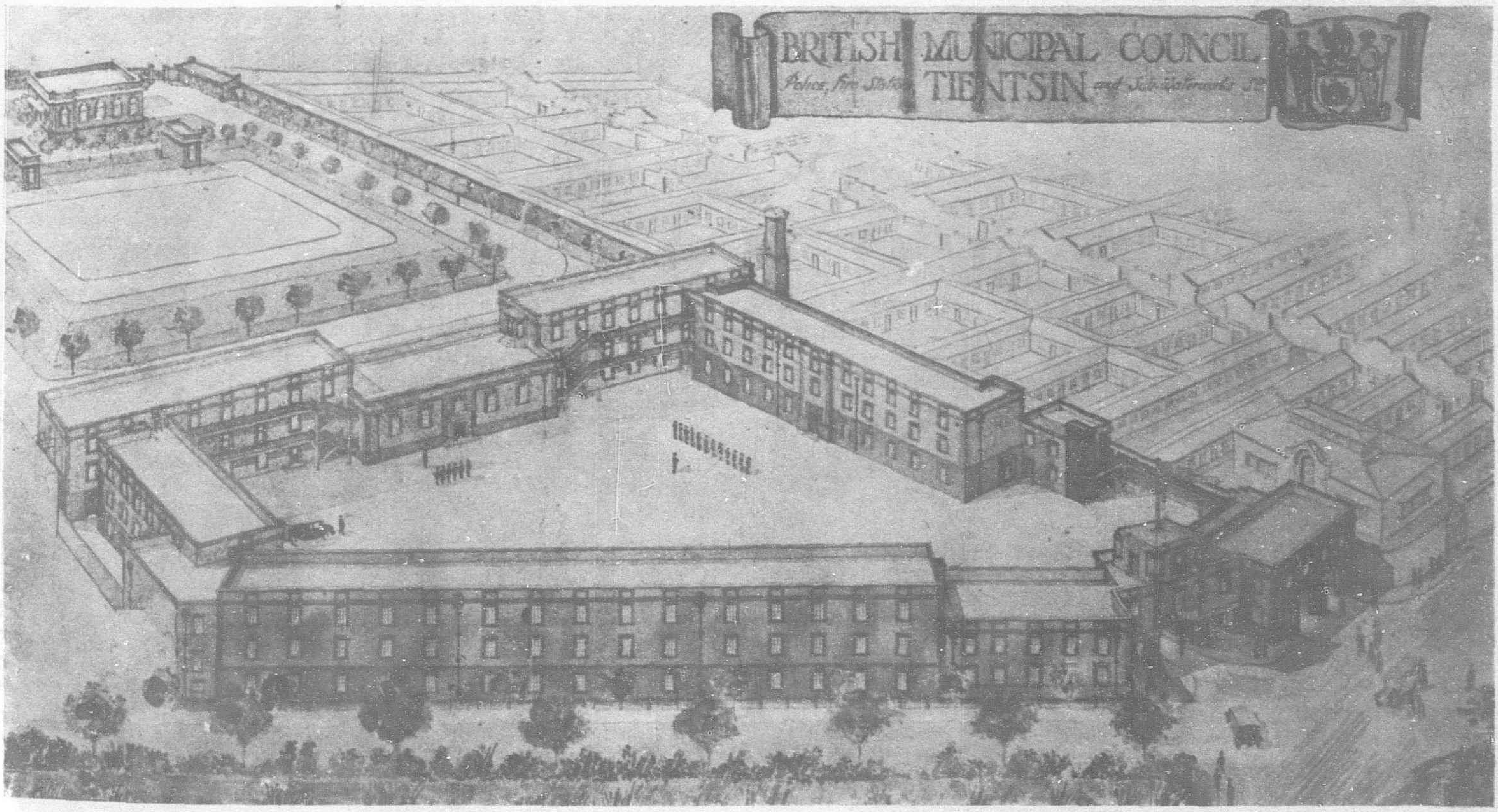
All the buildings are to be independent, each of them having their own entrances and staff rooms and service units but the whole of the five blocks are connected by a corridor which runs round the first floor. The quadrangle will form the play ground for the senior schools while the junior sections will have their own play grounds at the rear of their building.

The adiministrative offices and headmaster's room will later on occupy a central position in the assembly hall block which will be easily accessible to the other buildings.

The assembly hall is to be fan-shaped from the stage an ideal plan so far as visibility and accoustics are concerned. There will be a full sized stage with the usual dressing rooms and lavatories behind and on the balcony which will seat over three hundred persons there will be an operator's box for cinematographic performances. The roof of the hall is to be large concrete dome with openings which will be operated electrically and the hall itself is provided with large side windows affording cross ventilation. A feature of the hall will be the trap door in the floor of the orchestra well for the lowering of chairs into the cellar beneath the hall, the chairs may be easily slid down a shute when not required, and for public entertainments of a social nature additional sitting out accommodation can be obtained during clement weather on the large flat roof.

The rest of the 54 mow of land will be occupied by playing fields, tennis courts, a fives court and a most attractively designed Chinese pavilion with changing rooms for the athletes as well as service units. Grand stands for the convenience of onlookers will overlook all the playing grounds.


TIENTSIN
A.R.I.B.A.
MUNICIPAL · ARCHITECT
TIENTSIN · AUGUST · 1930


BRITISH MUNICIPAL COUNCIL
Police, Fire Station
TIENTSIN

The architect has adopted a Georgian style of architecture throughout and the buildings have been kept as quiet and unassuming as possible. All elaboration has been eliminated and reliance has been placed in noble proportions, good materials and fenestration to gain the desired effect.

The facing bricks are those manufactured by the K.M.A. and were specially chosen by the architect for their wonderful color and texture. All wood-work throughout the building has been eliminated as far as possible and with the exception of doors, either steel work or reinforced concrete has been used in the exterior portions. Peking stone has been used for coping effects. Corridors and service rooms are tiled and classrooms are finished with a mastic composition laid down by the P.W.D.

The roofs are of reinforced concrete insulated by two separate air spaces which will effectively keep out both heat and cold.

Mr. J. W. Williamson, F.R.I.B.A., the Municipal Architect, not only designed the plans of the buildings but also planned the hot and cold water system, the heating and sanitary installations and the work so far completed has been carried out under his supervision. A conservative estimate places the total cost of all the five blocks to be about half a million taels. The contractors for the work were Messrs. Geyling and Skoff. The plans for the reinforcement of floors etc. was designed by the Municipal Engineer, Mr. H. F. Barnes, M.E.I.C.

The completed block embody in their details all the requirements of the Board of Education in England with regard to the size of classrooms, seating accommodation, lighting and ventilation. Cross ventilation has been used throughout.

Communism, Demobilization and Loans

(*Continued from page 71*).

help, but before any more loans are advanced there will have to be an adjustment of outstanding obligations, some guarantee that they be recognized and repaid under a consolidated loan arrangement.

We cannot expect American or British investors to support any program for the financial relief or rehabilitation of China until they are assured that their previous loans will be paid. We cannot expect Japan to participate in any international financial transaction for the relief of China until her outstanding loans are recognized and incorporated in some equitable refunding scheme. Nor is it conceivable that all the lending Powers will consider any plan for financing China until some agreement is reached concerning the future status of Shanghai. China cannot have it all her own way.

China can be assisted, but it will be realized only after many preliminary obstacles have been removed, and then, instead of a vast loan without security or safeguards for its expenditure that will only perpetuate the present military menace, it will probably take the form of some cut-and-dried extension of credit for materials needed for reconstruction, some arrangement that will bring equal benefits to the lending nations.—G.B.R.

Fairy Flats (Yangtze Bar) Dredging Project

Outline Specification of Drag Suction Dredger

One drag suction type sea going hopper dredger delivered complete at Shanghai, with the following characteristics :—

1. An actual effective output of 25,000 cubic yards (20,000 cubic metres) of solid in situ silt (density 1.8) from the Yangtze bar per day of 10 working hours, including haulage to dump, dumping and return to site.

This approximately corresponds to an actual output during dredging of about 6,000 cubic yards (4,700 cubic metres) of in situ silt per hour, and a pumping capacity in water alone of not less than 20,000 cubic yards per hour (15,500 cubic metres per hour) or 56,000 Imperial gallons per minute (260 cubic metres per minute) and a corresponding supply of dilution water at the drag head of as much as 40,000 Imperial gallons per minute (180 cubic metres per minute). These figures are only indicative.

1. (*a*) *Description of material to be dredged.—The material* to be excavated is consolidated Yangtze silt-mud consisting of silicious and aluminous particles (specific gravity of grains about 2.75) generally about one-tenth of a millimeter in diameter with about ten per cent of fine colloid material. The mud is fairly coherent, requiring a half tine grab to excavate it with a grab dredger. It has an in situ specific gravity of 1.8. It can be easily broken up by a water jet with a velocity of 40-ft. per second (12 metres per second) and erodes slowly with a contact stream velocity of 5-ft. per second (1.5 metre per second). Samples of material will be provided on request.

2. Cruising speed in still water, loaded: 10 knots (18.5 kms/hour).

3. Allowed haul from cut to dump : Two sea miles (3.7 kilometers).

4. Size of cut : More than 9-ft. wide (2.75 metres) and not more than 2-ft. deep (0.6 metres).

5. Speed during dredging : Not less than 1½ knots (2.75 km/hr.) over the bottom, with or against a tidal current of 6 knots (11 km/hr.).

(Speed during dumping must be not less than 8 knots.)

6. Maximum loaded draft : 18-ft. (5.5 metres).

7. Depth of cut below water level : 18-ft. (5.5 metres) to 45-ft. (13.75 metres).

8. Hopper capacity : Consistent with the prescribed dredging, haulage and dumping, but not less than 2,000 cu. yds. (1,550 cubic metres) of actual dredged silt (as in situ and not including water retained in hopper). Hopper must be rapidly dischargeable by dumping and/or pumping. Hopper to be filled in about 25 minutes.

9. Fuel bunkers : To contain one week's supply of fuel. Dredger must be able to be bunkered at anchor from an attendant fuel ship. Coal probably preferred but oil fuel or oil engine designs may be submitted as alternatives. Local coal has a calorific value of 12,500 B.T.U. per lb. (7,000 calories per gram) with an ash content of over 25 per cent. The power arrangements shall be ample but consistent with economic working.

10. Construction : To be classed A1 at Lloyds or equivalent first class national registry. All steel. Good manoeuvring power, whether cruising, dumping or dredging, all under marine conditions. Rapid control of suction pipe and overload release for same.

11. Accommodation, etc. : Proper well furnished quarters for officers and crew with provision for tropical conditions, including specially good ventilation. All necessary navigation and dredger gear and auxiliaries. Electric light, wireless and refrigerator. Adequate spare parts.

12. Guarantee : Makers to guarantee materials, workmanship, seaworthiness, fuel consumption, time of construction, and specified output and to supply two officers for trials at actual site and for at least three months instruction. A bond to be given to take back vessel and return all payments in event of failure to secure output on the site. Customary construction and maintenance contract to be entered into, including all necessary insurance up to time of acceptance.

13. Terms of payment : 20 per cent at time of contract, 20 per cent after launching, 20 per cent after main machinery installed, 20 per cent after arrival at Shanghai and 20 per cent one month after successful trials and acceptance.

HERBERT CHATLEY, *Engineer-in-Chief.*

Shanghai, January 31, 1931.

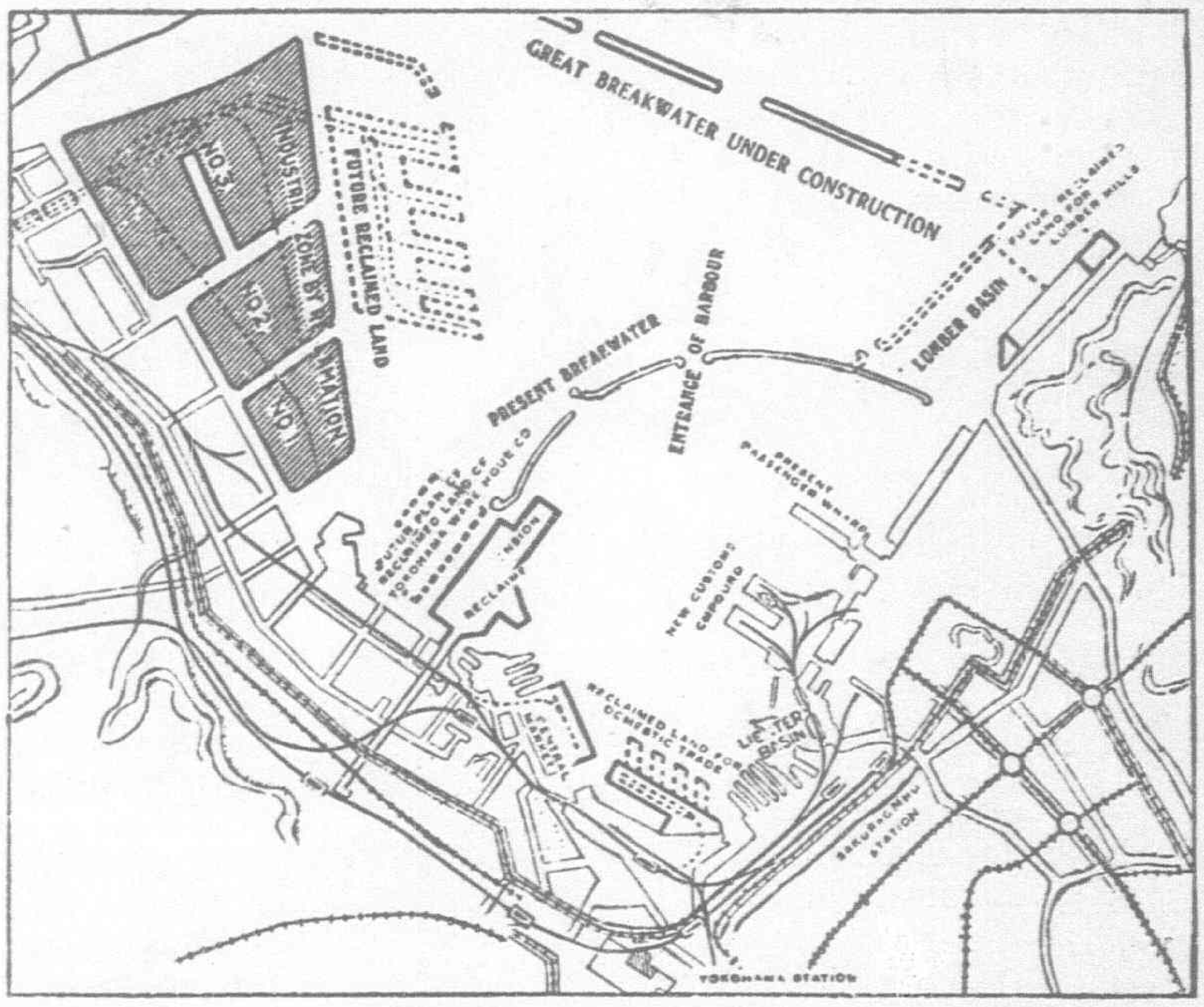
Sealed tenders, stating time of construction and accompanied by specification and drawing of general arrangement, must be marked on the outside Tender for Drag Suction Dredger, must be addressed to the Whangpoo Conservancy Board, Custom House, Shanghai, and must be delivered at that address before noon on September 1, 1931. Enquiries may be addressed to the Engineer-in-Chief. Letters from addresses in Europe should be marked "via Siberia" to save delay.

The Board does not bind itself to accept the lowest or any tender.

The New Municipal Industrial Districts in Yokohama Harbor

SHIZUO HARA, Director of the Yokohama Municipal Harbor Bureau

THE port of Yokohama had all its various institutions established by the nation's strength and enjoyed prosperity as the port forming the gateway to the capital of Japan as well as because of its completely monopolizing the export of raw silk, with the result that the said port naturally acted more as an intermediary as regards its trade, especially as there were extremely few items in the trade returns representing what was either produced or consumed in Yokohama City. In other words, the said port was actually lacking in the qualities of permanency and reliability. From the start Japan has been long and narrow in shape with harbors being scattered everywhere, possessing numerous facilities regarding marine transportation with a very small hinterland area. Consequently, with the general progress of the times the ports throughout various parts of the country became steadily repaired and improved, and the goods which concentrated on the two leading ports of Yokohama, Kobe gradually began to become scattered over all the ports throughout Japan.



The port of Yokohama used to maintain its original appearance by its old business customs, but a fundamental destruction was wrought by the disastrous quake-fire of 1932, making it impossible for some time to utilize the port at all, as it was absolutely impossible to permit the entry of vessels into it, with the result that the export of raw silk and silk textiles became transferred to Kobe. Moreover, vessels engaged in domestic trade were obliged to proceed to Tokyo harbor, and although things became considerably improved upon later on with the completion of the Reconstruction Work of Yokohama harbor, it was finally decided to set upon the work of reclamation within Yokohama harbor for the purpose of forming a so-called "Factory and Industrial District" along the coast of the harbor as the best means for fostering the development of trade of Yokohama by minimizing loading and unloading expenses as much as possible by installing most up-to-date and convenient loading and unloading equipment.

The reclaimed land may in all be divided into three sections, of which the work of constructing the quay-walls and the reclamation of land therein in the First Section, comprising a total land area of a little over 110,000 tsubo, was completed in the middle of November, whereas the construction of the 25 meter wide main road connecting with the main highway between Tokyo and Yokohama is expected to be completed during December. Moreover, the work of ground-levelling as well as the construction of the drainage system and roads within this section is expected to be completed for the greater part within the current fiscal year.

As for the rear portion of the Third Section the portion of the quay-walls below the high-tide mark is almost completed and as the work of reclaiming, *i.e.* the filling-up of the land, is going on actively, this section will probably be completed towards the latter part of 1931. With regard to the front portion, the quay-walls facing the open sea and the Tsurumi River have been completed below the high-tide level, and the quay-wall facing the Second Section is in course of construction at present, in addition to which the work of land reclamation is going at the rear of the quay-wall facing the open sea, so that this Section is scheduled for completion by about July or August of 1932.

As for the Second Section the construction of the quay-walls is expected to become completed by the end of the current fiscal year together with the work of land reclamation within the said walls. The plans for the laying of the railway sidings up to the reclaimed ground are being drawn up by the Government railway authorities at present. The cost for laying the sidings on the reclaimed land will be borne by the Municipality, and the laying of the sidings up to the First Section is expected to become completed within the 1931 fiscal year, so that the erecting of factories in the First Section and the rear portion of the Third Section may be commenced from the end of December 1930 and the end of 1931 respectively. The entire sea surrounding this "Factory Area" will maintain a water depth of 32 feet even at spring tide, so that the canals between the reclaimed lands were designed to have a width of 50 ken (30 feet) and a water-depth of nine feet even at spring-tide. However, the said plans have been changed in such a manner that the canals between the Second and Third Sections as well as between the front and rear portions of the Third Section will become widened from between 80 and 100 ken and that the water depth will be 30 feet even at spring-tide, thereby enabling the mooring of 10,000 ton class steamers within over one-half of the reclaimed land, in addition to which the railway and road system will interlink every section.

In other words, the whole of the reclaimed land, covering an area of 640,000 odd tsubo will become interlinked with the land at any spot through roads and the railway system, whereas all steamship and lighter facilities can be enjoyed at sea, so that it is most ideally located from the standpoint of industrial rationalization especially as it lies within the largest open port in Japan and is not far off from the waters of the Pacific Ocean. I consequently believe that there can be no better place for an industrial area dealing with the continents of America and Asia, and it is obvious that, with the realization of this "Factory Area" scheme before long, the economic reconstruction of Yokohama harbor will be made complete by its trade becoming placed on a solid and reliable basis which was hitherto merely of an intermediary nature.

I am given to understand that there are some folks who open that the business activities of the Kannai District, which has hitherto been the bustling center of the trade and general commerce of Yokohama, may fade away by the center of the prosperity of Yokohama City become moved eastwards, but there is no other alternative for the sake of the City as well as Harbor of Yokohama than the encouragement of industrial enterprises. Moreover, the industrialization of Kanagawa and Tsurumi districts due to there being no suitable spot near the present business center, *.i.e* Kannai district will result in the latter district enjoying prosperity as a commercial and residential center, so that there is in fact no cause for entertaining such fears.

Whangpoo Bridge Plans

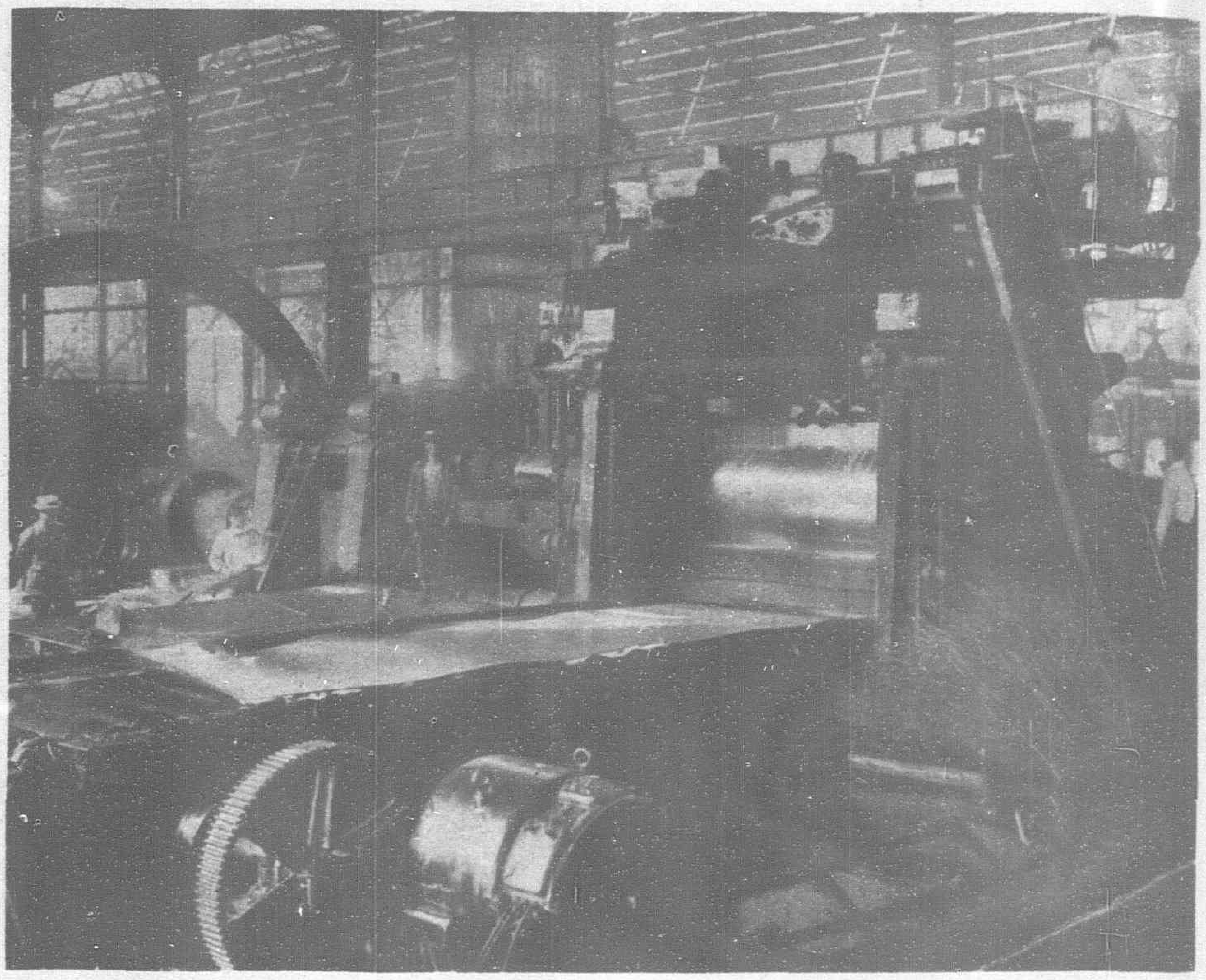
Plans for the proposed construction of a steel bridge across the Whangpoo River at Shanghai are to be discussed by the public works bureau of the Municipality of Greater Shanghai.

Promoters of the scheme have been requested to call at the bureau to discuss the matter.

The materials for the proposed bridge, the promoters state, will be supplied on credit by a German firm. It is stated also that the promoters stand prepared to subscribe the sum of $200,000 as capital. The work, if undertaken, will be done under the supervision of the Municipality.

Japan's Steel Production

*By G. H. AUPPERL**



The Plate Mill at the Fukiai Works of the Kawasaki Dockyard, Kobe

JAPAN, to distinguish herself, is striving hard in the manufacture of iron and steel. To help it acquire recognition as quickly as possible the three leading steel plants and the most important foundry for the past few years have employed leading American and German engineers and metallurgists to teach them the art. About 60 per cent of the equipment in these plants was manufactured in America and the balance was imported from Germany.

Japan now is consuming about 2,550,000 metric tons of steel annually and is exporting more than 200,000 tons. This shows an increase in demand of five and one-half times that of 1907, while during the same period manufacturing capacity has increased almost 20 times.

The two principal steel plants produce about 1,800,000 metric tons of ingots and castings annually. One of these plants, the Imperial Steel works, is owned and operated by the Japanese government and is located at Yawata, Fukuoka Ken. Kyusku, under the management of Reisaku Nakai. This plant, which annually produces more than 1,000,000 tons of steel ingots, or about 60 per cent of the total output of the empire, was established 1897 at Yawata, a city of 150,000 inhabitants located about two miles from the Japan sea with which it is connected by the Wakamatsu bay.

The total investment of the government in this plant is more than Y.130,000,000, or about $64,000,000 gold. It employs 18,000 workers and its by-products alone are valued at nearly $3,000,000 gold yearly. It owns and operates a number of coal mines producing about 1,300,000 tons of coal annually. Its nine blast furnaces have an annual capacity of 1,000,000 tons. Steel-making equipment consists of 46 open-hearth furnaces of 1,335,300 tons capacity. The 37 stands of rolls have a capacity of 1,059,800 tons of finished products. Coke ovens number 525 with capacity of 1,052,600 tons.

The following table gives the annual production in metric tons of pig iron, steel and coke of the Imperial plant during the past three years:—

	1927	*1928*	*1929*
Pig iron	734,800	831,800	781,000
Steel ingots	1,056,600	1,164,300	1,325,200
Steel bars	830,000	937,200	1,059,800
Coke	859,800	903,800	925,600

Principal finished products are rails, angles, U bars, T bars, rounds, cables, plates, black sheets, tin plate, rivets, and axles. The bulk of raw materials is imported, natural resources being very scarce. Iron and manganese ores come from Chosen, Yangtze valley of China and India. Some of the mill rolls are made in the roll foundry and others are imported from America, Germany and France. The Tobatta Foundry Co., one of the Japanese roll makers, furnishes many chilled and sand rolls also.

Another of the large Japanese steel plants is the Fukiai works of the Kawasaki Dockyard Co., located in the eastern section of Kobe. The first unit consisted of a plate mill which started operations in July, 1918, while the European war still was in progress and was used principally for the company's own requirements of steel plates in the marine boiler and locomotive division. Plates ¼-inch and thicker are rolled at this mill which has a capacity of 100,000 tons annually.

The first unit of the sheet mills went into operation in June, 1924, including three finishing and three roughing mills and two stands of cold rolls with a capacity of 20,000 tons of sheets varying from 11 to 30½ gage inclusive, the latter comprising about 80 per cent of the output. Owing to the increasing demand for steel sheets it was found necessary to add new units until in December, 1928, 25 stands were operating with an annual capacity of 200,000 metric tons. A small tonnage of sheet bars is made from plates from the plate mill and the balance of the requirements is imported from the United States, Germany and Belgium. To insure a more uniform quality and at the same time minimize the cost of production it was decided to install a sheet bar mill. This was purchased from Germany and began rolling in May, 1929, and since then the tonnage of imported sheet bars has diminished greatly. Last year imports of steel bars represented less than 30 per cent of consumption.

Thick Plate Mill at the Yawata Steel Works

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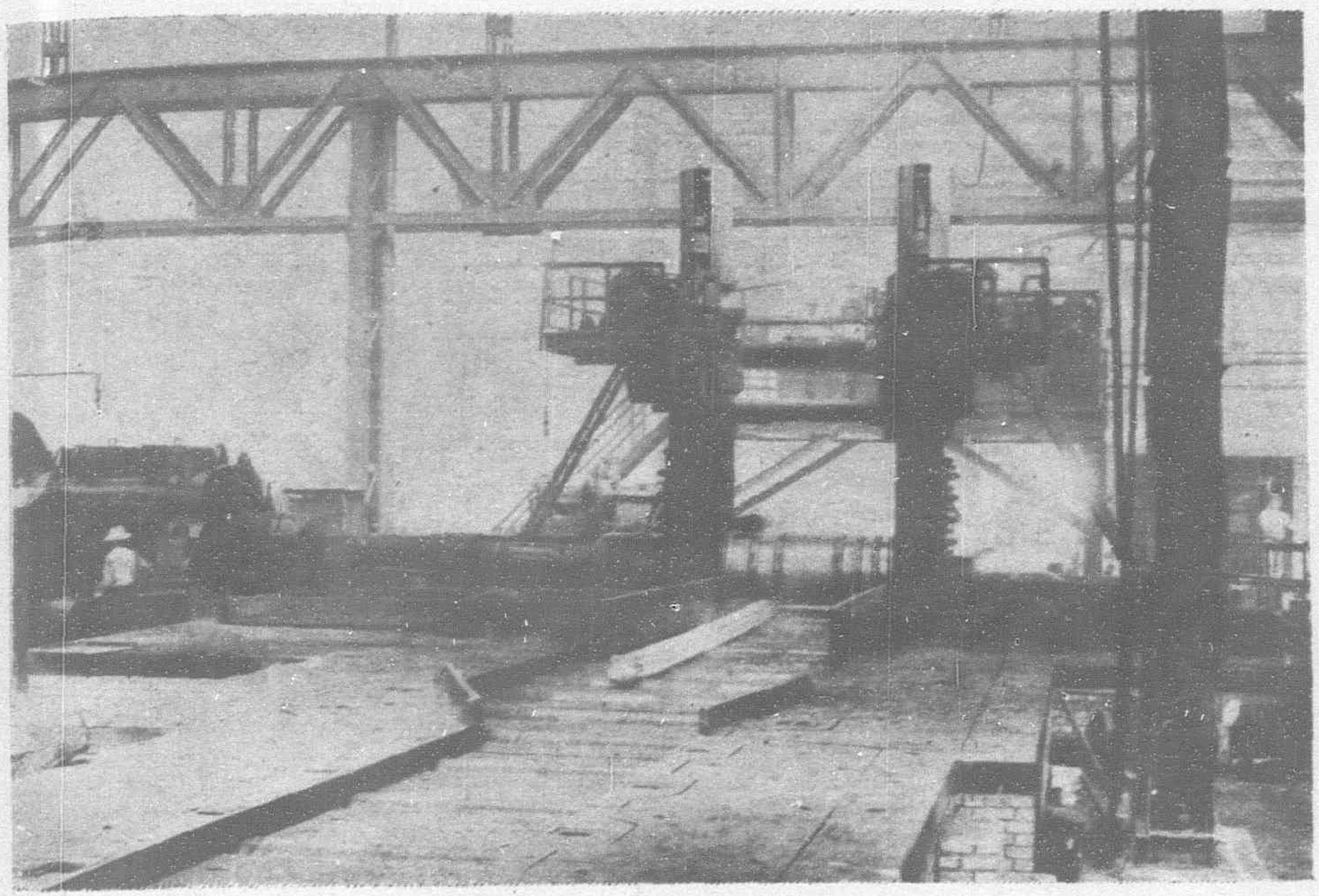
*From *Steel*.



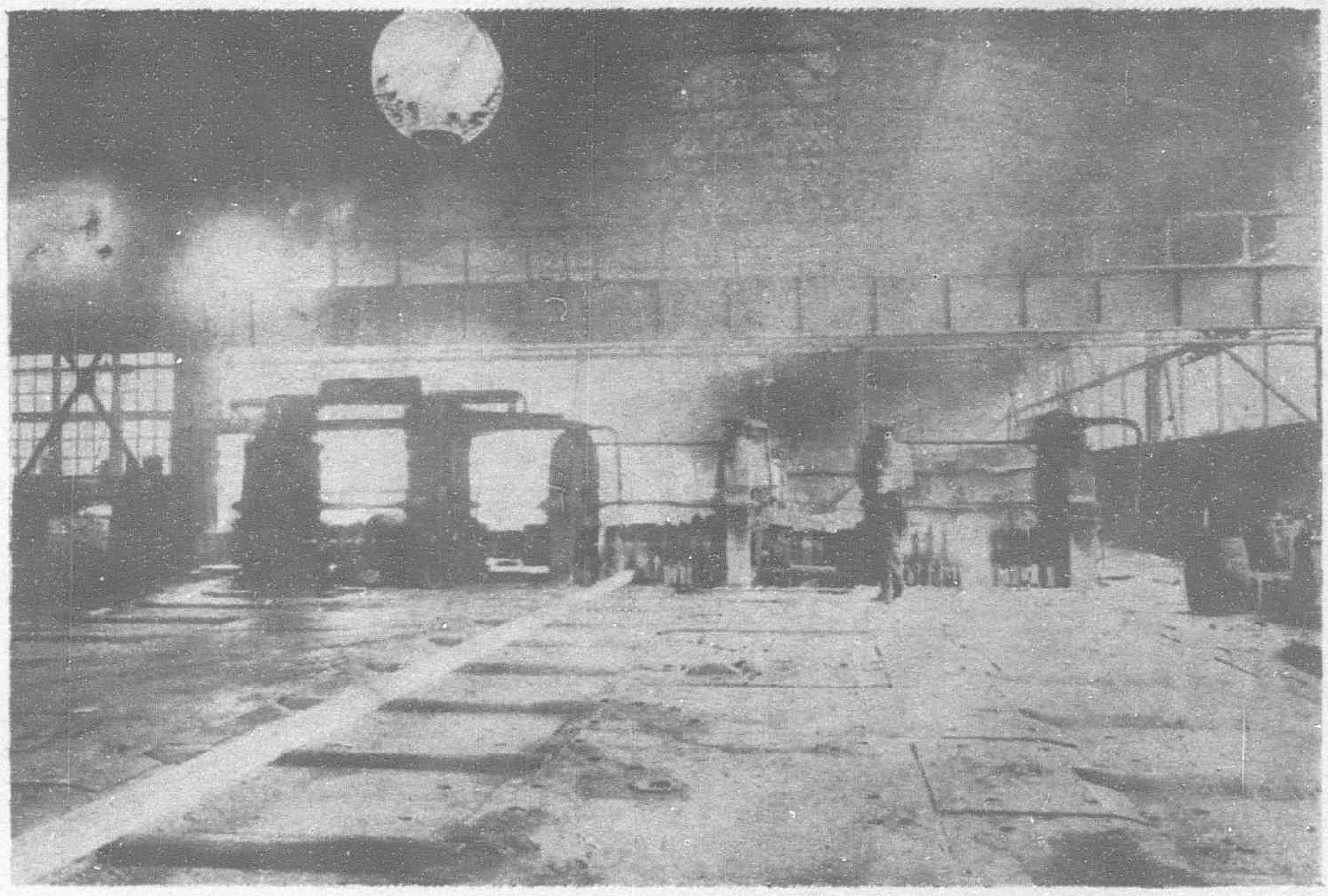
Ingot Roller at the Yawata Steel Works

Operate Three Companies

The Kawasaki Dockyard Co., Ltd., which controls the Fukiai works, was founded in 1886 and was incorporated into a limited liability company in 1906 with a capital of Y.2,000,000, or about $99,500 gold, and this since has been increased to Y.90,000,000. The company controls three distinct undertakings, a shipbuilding and engineering works, aviation works and the plate and sheet mills, while it operates the Kawasaki Locomotive & Car Co. and Kawasaki Steamship Co. as subsidiaries.

Religious ceremonies play an important part in the dedication of new plants or equipment in Japan. The rites usually consist of the placing of salt on each piece of new machinery and as it begins to function, salt and sometimes rice is thrown on the equipment. In 1929, the writer was invited to attend the launching of a 6,000-ton steamship in Kyushu and as it was sliding down the ways two Buddhist priests continued to throw salt at it while during the ceremony the officials of the shipyard threw thousands of small cakes made of rice to the spectators. This is a very old custom in Japan and although salt retails for about 26 cents gold per pound, it is used even in the homes when any new equipment, such as stoves, pumps, etc., are installed. Because of their long standing the religious ceremonies are of considerable value in instilling confidence in the workers.

YANGTZE CONSERVANCY.—In view of the urgent need for the dredging and improvement of the lower reaches of the Yangtze River, a conservancy program entailing the expenditure of $52,260,000 for the Woosung-Hankow section of the river has been formulated by the Yangtze River Conservancy Board under the Ministry of Communications. To raise the necessary funds, the levy of a surtax on goods transported to various ports on the Yangtze valley is contemplated.



Rail Mill at the Yawata Steel Works

New Goodell-Pratt Tools

The new No. 17 catalog recently issued by the Goodell-Pratt Company of Greenfield, Mass., U.S.A. is profusely illustrated and its 416 pages show many interesting additions to their extensive line.

Among these new items the No. 188 Automatic Drill and No. 923 Hack Saw Frame stand out for their performance, design and workmanship and their immediate appeal to tool users.

The No. 188 is built on the same lines as their other Automatic Drills, but is provided with a moulded, black, genuine bakelite handle that holds the eight drill points in separate compartments from which they are released one at a time through a hole in the rotating cap. The bakelite handle affords a comfortable grip, makes the tool very light and is practically unbreakable. This tool is offered at the very low list of $1.40 each.

The No. 923 Hack Saw Frame is a beautiful, well balanced frame with all metal pistol grip handle and nicely finished throughout. It is built to stand a tension of 275 pounds between the studs without any injury to secure a very rigid, durable frame. The list of $1.20 indicates the company must have reached a very large production of these frames.

The Goodell-Pratt Company offers their new catalog without any obligation to any one interested in the importation of fine quality tools.

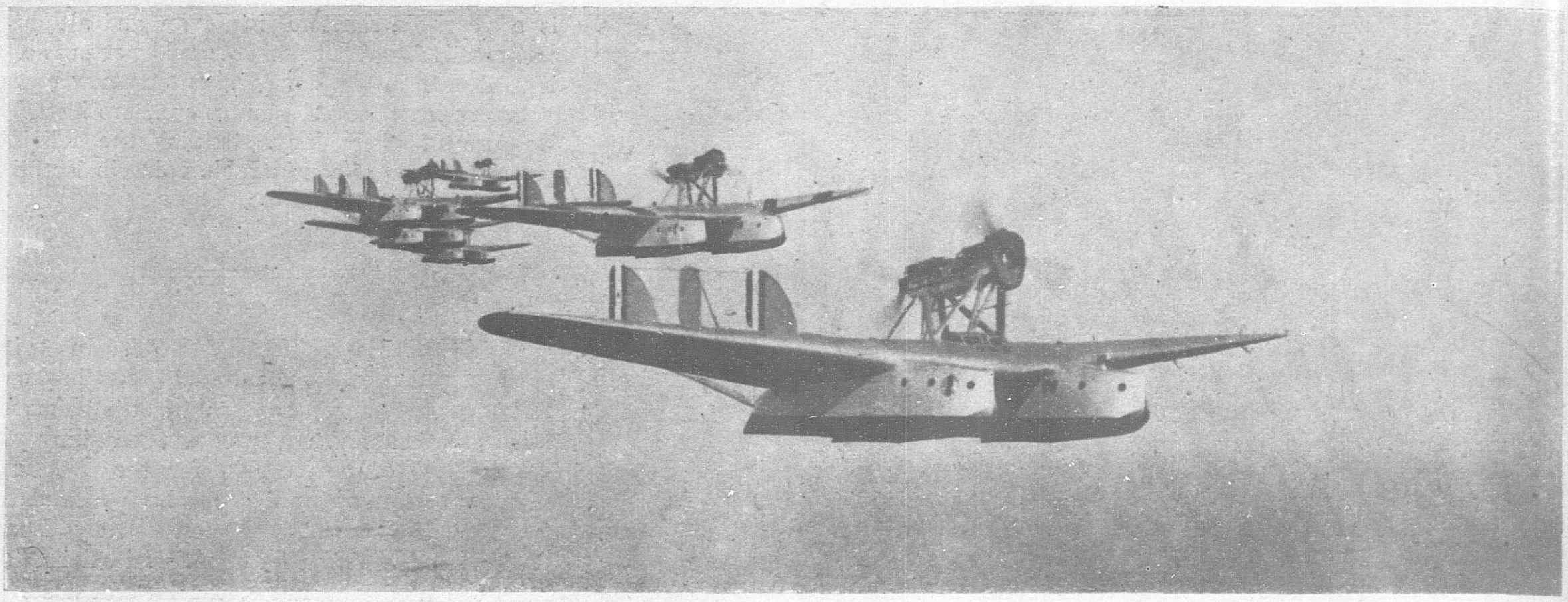
New Dredge for the Philippines

The new river dredge for the port of Iloilo, now under construction in the yards of F. Schichau, G. m. b. H., Elbing, Germany, will be completed in about seven months and will be towed to the Philippines by the new customs cutter which is also under construction at the same yards.

The dredge will proceed to Iloilo shortly on its own power. This dredge, unlike the dredger Manila, is not a sea going ship, it was explained at the office of Reither-Akerman Company, local agents of F. Schichan, but it will be able to make the trip to Iloilo unaided.

This is a suction pipe line dredge, which according to specifications, is capable of an hourly output of 300 cubic meters. It is about 42 meters long, 11 meters beam, and 1.40 meters draft. It is to be a steam vessel equipped with oil burners. The ship is to have a speed of nine and one-half miles per hour.

The contract price of this dredge, together with 300 meters of floating pipe and 7,200 meters of land pipe, is P360,000, delivered at Manila.



The Italian Air Squadron of 14 "Savoia-Marchetti" Planes Under Command of Air Minister Balbo on its Epic Trans-Atlantic Flight

An Epic Flight

The Italian South Atlantic Cruise

For the first time in the history of aviation, the Atlantic has been crossed by a large organized group of military planes. Twelve attempts had been made from 1922 to 1930; of these, two were unsuccessful, and three were carried out by Italian "Savoia-Marchetti" planes (two "S.55" and one "S.64"). The latter plane won the world distance record by a direct flight from Rome to Brazil. It was piloted by Ferrarin and Del Prete.

In the first days of 1930, H. E. Balbo, Minister of Aviation, started preparing for this great cruise, creating at Orbetello (Tuscany) a special aviation school, training the crews to fly in any weather, by day and by night, for long stretches. Meanwhile, the "S.55 T.A." plane, differing from the standard "S.55" by having larger hulls able to carry about 4,800 kos. of fuel, was being built at the Officina "Savoia." In the "Fiat" works, the "Fiat A.22R." motor, fitted with a reducer, of a 560 h.p. with 2,100 shaft revolutions and 1,360 propeller revolutions, was built and tested.

The planes were equipped in such a way as to enable them to maintain a long stay out at sea, even in bad weather, and supplied with all the necessary instruments for transoceanic flight.

The Orbetello-Rio de Janeiro stretch was divided into seven stations: Orbetello Cartagena (Spain) Km. 1,200-Cartagena-Kenitra (Morocco) Km. 700-Kenitra-Villa Cisneros (Spanish Rio de Oro Colony) Km. 1,600 Villa Cisneros-Bolama (Portuguese Guinea) Km. 1,500-Bolama-Port Natal (Brazil) Km. 3,000-Port Natal-Bahia (Brazil) Km. 1,000-Bahia-Rio de Janeiro Km. 1,350.

Stores of benzine, oil, and exchange parts were installed at the bases, and entrusted to Italian officers and staff. *s.s. Alice*, which remained at Bolama, as the starting base for the group, and *m.v. Aosta* which carried the supplies to the Brazilian coast, were assigned to this service. The organization of the West Africa Coast base was under Col. Ilari, that of the Brazilian base by General Pellegrini, both belonging to the Italian Air Force.

The cruise took place under direct command of H. E. Balbo, Minister of Aviation, and Air Squadron General, accompanied by Chief of Staff H. E. Col. Valle; the organization and instruction of the crew was supervised by Lieut.-Col. Maddalena and Major Longo.

Fourteen planes, amongst which two workshop-planes which were to remain at Bolama, left Italy. The group was divided into four squadrons, distinguished by means of colored bands painted across the wings; a black band for the first, a white one for the second, a red one for the third, and a green one for the fourth.

On the morning of December 17, 1930, the Italian group started from Orbetello, bound for Cartagena; encountering, along the way, a violent storm, that partly prevented communications by sea along the Spanish and Algerian coast. The planes fought brilliantly against the elements, and reached their destination.

After stopping for a few days on account of the bad weather, they left Cartegena on the morning of the 21st., reaching Kenitra on the same day at 1.40 p.m., mooring in the Seton River. Here they were greeted by two squadrons belonging to the 37th. French Air Regiment, led by General Argengaud, Commander of French Aviation in Morocco.

On the 23rd, the Italian Airmen left Kenitra, arriving on the same day at Villa Cisneros, after meeting and overcoming a strong sand-laden wind, which greatly inconvenienced the crews. During this stretch, the motors, although defenceless against the sand, continued to work without giving any trouble. On the 25th, the group reached Bolama, where preparations for the Atlantic crossing began.

H. E. Balbo, who had previously decided to leave in the night

H. E. Italo Balbo, Italy's Minister of Aviation Who Personally Commanded the Four Air Squadrons Which Flew from Italy to Brazil

Air Minister Balbo and Group of Flying Officers Who Participated in the Italy-Brazil Trans-Atlantic Flight

between January 4 and 5, in order to have the benefit of moonlight, wished to arrive a few days earlier, in order to have the time necessary for a partial overhauling of the planes, and to let the crews make a few experiments in starting with gradually-increased loads, in order to enable them to accomplish starting operations in the best way; these were rightly foreseen to prove very difficult in the torrid equatorial atmosphere.

The group was visited, at Bolama by Pilot Rasini who, with his flight companions, Mazzotti and Lombardi, was on the way back from his great African tour on "Fiat A. S.2" touring planes.

Lightened of all other weights, supplied only with a floating anchor in case of a forced mooring, the planes took off in the night of January 5.

The atmospheric service, as radioed by the stations of the Brazilian Coast, indicated good weather during the first part of the journey, and bad weather near the Brazilian Coast.

The departure of the two workshop-planes was decided at the last moment, so that the planes were fourteen at starting.

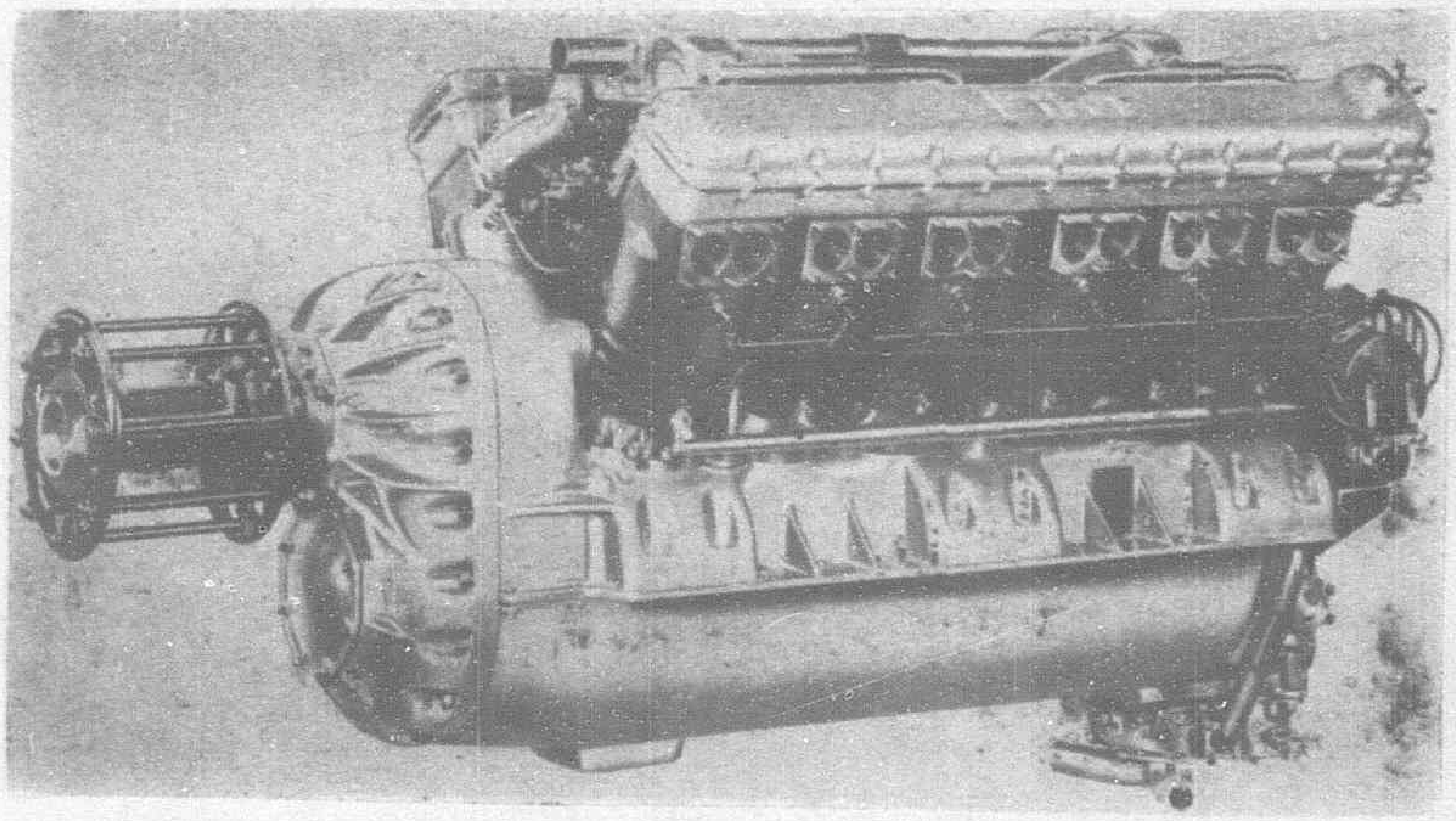
Departure was very strenuous; the planes, loaded to a maximum, weighed over 10,000 kilos, and left tangent. Two of them were forced down; one lost a floater, and the motorist in it was killed; the other got on fire, and the whole crew (four people) was killed. H.E. Valle's plane could only start an hour and a half afterwards, after many attempts.

Safety was insured, during crossing, by the naval division commanded by Admiral Bucci, consisting of eight swift scout units of the *Navigator* class, which reaches a 40 knots per hour speed. These units were posted along the way and remained in constant touch with the planes, by means of radio. Two planes were forced to alight during the flight; one on account of damage to the motor, and the other owing to the trouble with the feeding pump; both came up afterwards.

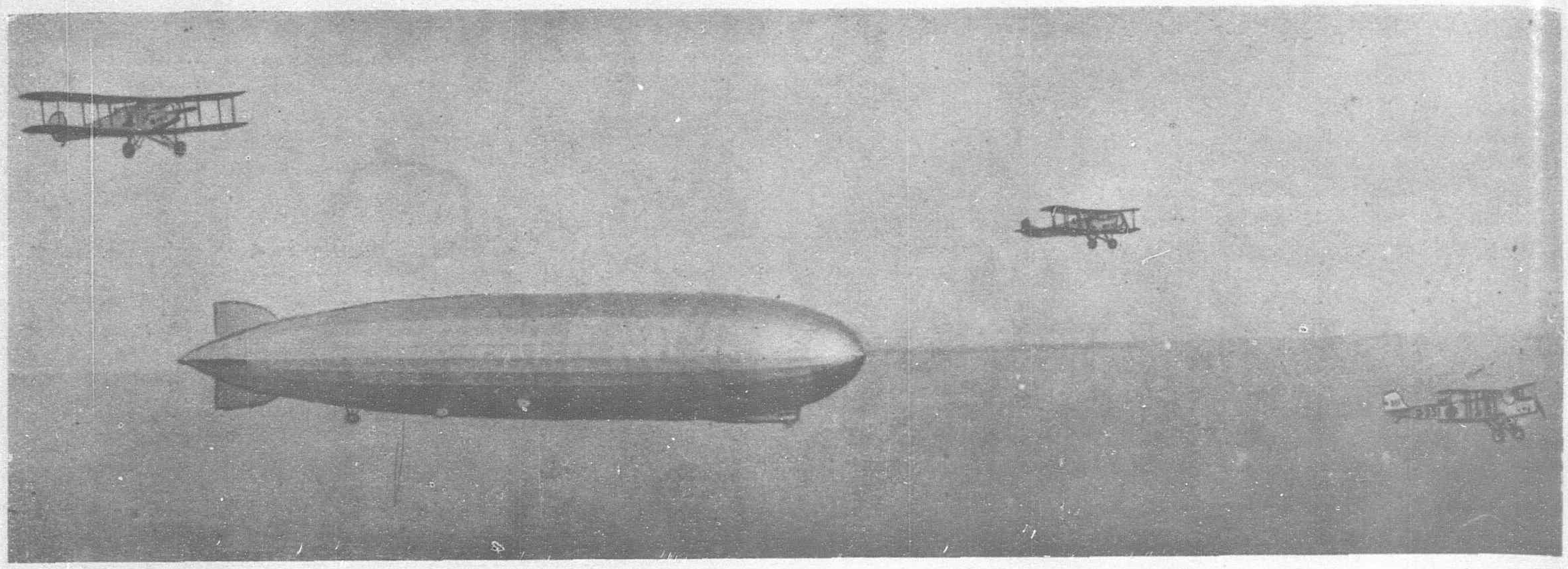
During the first part of the crossing, flight was very difficult on account of the tremendous weight of carbure; during the second part, it was hindered by violent rains, a thick fog, and heavy winds. However, on the 7th of January, 10 planes arrived in a group at Port Natal, where they were heartily greeted by the population. The other two planes followed closely. By arriving at Port Natal, the Atlantic cruise accomplished its aim; the following stations are of no technical importance, and only interest society and political chronicles.

The sorrowful incidents which attended the departure of the group from Bolama detract nothing from the value of the enterprise, or from its success, which is entire and complete, and must be considered as much more valuable than the individual enterprises carried out previously. What, in previous flights was particularly the outcome of personal daring, has now been carried out by a perfect organization and an excellent training. Both crews and planes have shown how it is possible to transfer to an organized group the qualities that had been the boast, until now, of single parties, and the wonderful results that may be

(*Continued on page 113*).



The "Fiat A. 22 R" Motor 560-600 h.p. Fitted With a Reducer. The "Savoia-Marchetti" Planes were Fitted with this Motor



The Graf Zeppelin Flying over Kasumigawa Escorted by Japanese Aeroplanes

Summary of Japan's Aeronautical Progress

During the civil war of 1877, the Japanese Government manufactured a balloon intended for use in its punitive expedition against the insurgents. Although this balloon was not used it marks the first step taken in manufacturing aircraft in Japan.

In 1894, a glider model was completed by Mr. C. Ninomiya, and during the Russo-Japanese War of 1904-5, the Japanese army for the first time utilized balloons for reconnoitring and other purposes.

In 1907, a balloon corps was organized. In 1910, two military officers, Lieutenants Hino and Tokugawa, were despatched to Europe to study aerial navigation, and upon their return at the end of the same year, performed flights at Yoyogi near Tokyo.

A few months prior to the flights above-mentioned, Mr. Yamada navigated an airship between Osaka and Komaba, the first aerial flight in Japan.

In 1911, an American land-plane pilot arrived in Japan, and in April of the same year, a military aerodrome was first established at Tokorozawa.

In 1912, another American water-plane pilot arrived in Japan and in the autumn manoeuvres, a number of aeroplanes and airships participated.

In 1913, the Imperial Aviation Society was established. In this year, a civil aviator, Mr. K. Takeishi, while flying at Fukagusa, was killed, the first aerial disaster in Japan. In the following year, 1914, an aerial contest was held under the auspices of the Imperial Aviation Society. In 1916, Mr. Art Smith, arrived in Japan and displayed his wonderful feats.

In 1917, civil aviation enterprises were temporarily destroyed, owing to the tidal wave that swept the coast in Kwanto district in the autumn of that year.

In 1920, the Bureau of Aerial Navigation was established. In 1921, regulations for the control of aerial navigation were promulgated and put in force.

In 1921, a regular air line was opened between Sakai and Shikoku by the Nippon Aerial Transportation Research Institute.

In 1922, two regular air lines between Tokyo and Osaka, Osaka and Beppu, were opened by the Tozai Teiki Aviation Institute and the Nippon Aerial Navigation Company, respectively. In 1925, the air mail service was inaugurated. In the same year, a Japan-Europe flight *via* Siberia was carried out successfully under the auspices of the *Asahi Shimbun.*

In 1926, the Japanese Navy purchased from Italy a N-3 dirigible. In 1927, a law governing the aerial navigation, was promulgated and put in force.

In this year, the Imperial Aviation Society announced its plans for a trans-Pacific flight but was obliged to give them up owing to the fact that the Society had not sufficient confidence in the long distance endurance strength of the machine manufactured with native materials. During this year, the aerial pas-

A Mitsubishi-Henriot Training Plane

senger and freight service between Osaka and Oita was opened by the Japan Aerial Transportation Research Institute.

In 1929, the Japan Aerial Navigation Company inaugurated a passenger and freight service. In the meantime, the Department of Communications, in view of the development of the above regular aerial lines undertaken by private companies and also of the gradual increase in the number of foreign planes visiting Japan, endeavored to contribute towards the completion of international air lines, and are about to achieve their ends. The visit to Japan of the Graf Zeppelin on August 19, 1929, gave a tremendous impetus to Japan's aviation circles.

Aviation Conditions in Japan

(Since September, 1929.)

The Tozai Teiki Aviation Institute, opened a regular aerial postal service on September 23, 1929, between Tokyo and Hokuriku districts.

The Ishikawajima Aeroplane Manufacturing Works, in October, 1929, purchased the right of manufacturing in Japan the *Slot* Wings invented by Dr. Rahaman (a German expert attached to the works) from a British firm in possession of the right in question.

The 5th Civil Aviators' flight contest was held at the Yoyogi Parade Ground on November 3, 1929, in which 21 planes participated, two being piloted by girl fliers.

The Japan Aviation School opened a regualr aerial passenger, freight and mail service between Tokyo and Shimoda on November 17, 1929, with mono-hydroplanes. The service on May 16, 1930, has extended to Numazu and Shimizu.

The Technical Research Section of the Military Air Force developed in April, 1930, a new and easy method of producing hydrogen gas to be used for airships. By this invention, gas to fill 300 cubic meters can be produced in eight hours, whereas by the older system, it took several days.

Of aviation and other organs, a league of students' aviation associations, consisting of six universities and two colleges in Tokyo, was organized in April, 1930, and commenced aerial training from June, 1930. With the support of the Bureau, the league contemplates holding its first championship contest among student aviators in the Spring of 1931. For this contest, seven planes of various types are to be used.

Engineer Lieut.-Commander T. Isobe, a veteran pilot in Japanese aviation, succeeded in manufacturing a glider for sporting purposes, which proved a great success when tested at Tokorozawa on May 11, 1930.

A remedy for "aerial sickness" was discovered in May, 1930, by Captain H. Tanaka, M.D., Chief of the Medical Corps attached to the Kasumigaura Air Force.

In June, 1930, plans were formulated for the establishment of the "Eastern Hemisphere Aerial Transportation Company" to undertake regular aerial services by means of dirigibles between Japan and America, Japan and Europe. The promoters held a meeting in June and sent in an application to the authorities for approval of their project. According to the plans, the company is to be formed with a capital of Y.120,000,000 and the first attempt is to carry out flights between Tokyo and San Francisco and between Tokyo and Paris.

Spacious grounds are to be leased in the suburbs of Tokyo and San Francisco. The dirigible to be employed for this line is to be an L.Z. 128, with capacity of 145,000 cubic meters, equipped with eight machines of 600 horse-power each, capable of carrying 40 staff members, the same number of passengers and four tons of freight. The time for covering the distance between the two places, is estimated at 68 hours. The Nagoya Works of the Mitsubishi Aeroplane Manufacturing Company, in June, 1930, commenced to manufacture a large-sized passenger plane, modelled after similar planes manufactured in Europe and America, adopting their best parts and basing its outline on the structure of the Junker G.38. It is a monoplane with wings 52 meters in length, 6 meters in thickness and a body 38 meters in length, having a total weight of 28 tons, equipped with five machines, 600 h.p. each, made after the model of Junker L. 55. Within the wings, are provided 30 beds.

To facilitate regular aerial service at night, the Department of Communications commissioned Mr. M. Kawano, engineer of the Tokyo Electric Company, to devise lighting equipment for the regular airways. Mr. Kawano has completed special lights capable of finding out the position of aerodromes and other safe landing points and also of notifying aviators of the direction of the wind.

The Aeroplane Manufacturing Works at Hamamatsu, having secured a field of 120,000 tsubo, adjacent to the military aerodrome at Mihogahara, as a site for the establishment of an aviation academy, have applied to the Department of Education for approval of their plans. If this project materializes, this will be the first institution of its kind established in Japan.

In early August, 1930, the Aviation Bureau of the Department of Communications formulated its plans relating to projected regular aerial lines throughout the country and decided that future extension of existing lines be effected in accordance with these plans. Passenger planes on the regular line between Tokyo and Dairen had wireless and radio apparatus installed as from September 23, 1930.

Authorized Aerial Pilots and Mechanics September, 1930

First Class Pilots, 145; Second Class Pilots, 83, including four girls; First Class aviators, 20; Second Class aviators, 101; Mechanics, 102; Third Class Pilots, 62, including three girls and balloon pilots, three.

Victims of Aeroplane Disasters (Up to September, 1930). Civilians 86, and military and naval men 189.

Aerodromes

Army :—The Military Aviation School at Akeno, Miye Prefecture; Military Aviation School at Shimoshitsu, Chiba Prefecture; Military Aviation School at Tokorozawa, Saitama Prefecture; Aerodrome at Kagamugahara, Gifu Prefecture, attached to the 1st and 2nd Air Regiments; Aerodrome at Yokkaichi, Shiga Prefecture, attached to the 3rd and 8th Air Regiments; Aerodrome at Tachiarai, Fukuoka Prefecture, attached to the 4th Air Regiment; Aerodrome at Heijo, Chosen, attached to the 6th Air Regiment; Aerodrome at Mihogahara, Shizuoka Prefecture, attached to the 7th Air Regiment.

Navy :—The aerodrome at Omura, Nagasaki Prefecture; Aerodrome at Yokosuka, Kanagawa Prefecture; Aerodrome at Sasebo, Nagasaki Prefecture; Aerodrome at Kasumiga-ura, Ibaraki Prefecture.

Government :—The Tokyo Aerodrome at Tachikawa-machi; Osaka Aerodrome at Funamachi; Fukuoka Aerodrome at Tatara.

Private :—Miyagi Aerodrome at Miyagino, Sendai; Nakashima Aeroplane manufacturing company's aerodrome at Otamachi, Gunin Prefecture; Nakashima Aeroplane Manufacturing Company's aerodrome at Tachikawa, Tokyo Prefecture; Hokkaido Aviation Society's Aerodrome, Hokkaido; Nagishi Aerodrome at Niho-no-Matsubura, Shimizu City; Yamato Aviation Society's aerodrome, Nara.

Aviation Schools

The Nippon Hiko Gakko; the Hasegawa Hiko Kenkyu-sho; the Nippon Yuso Kenkyu-sho; The Mikuni Hiko Gakko; the Suzuki Hiko Kenkyu-sho; the Akita Hiko Gakko; The Tokyo Hiko Senmon Gakko; the Nippon Chuo Hiko Gakko; the Nishida Hikoki Kenkyu-sho; The Tokushima Koku Gakko; the Dai-ichi Koku Gakko; the Nagoya Hiko Gakko; The Mazume Hiko Kenkyu-sho; the Ando Hikoki Kenkyu-sho.

An Epic Flight

(Continued from page 111).

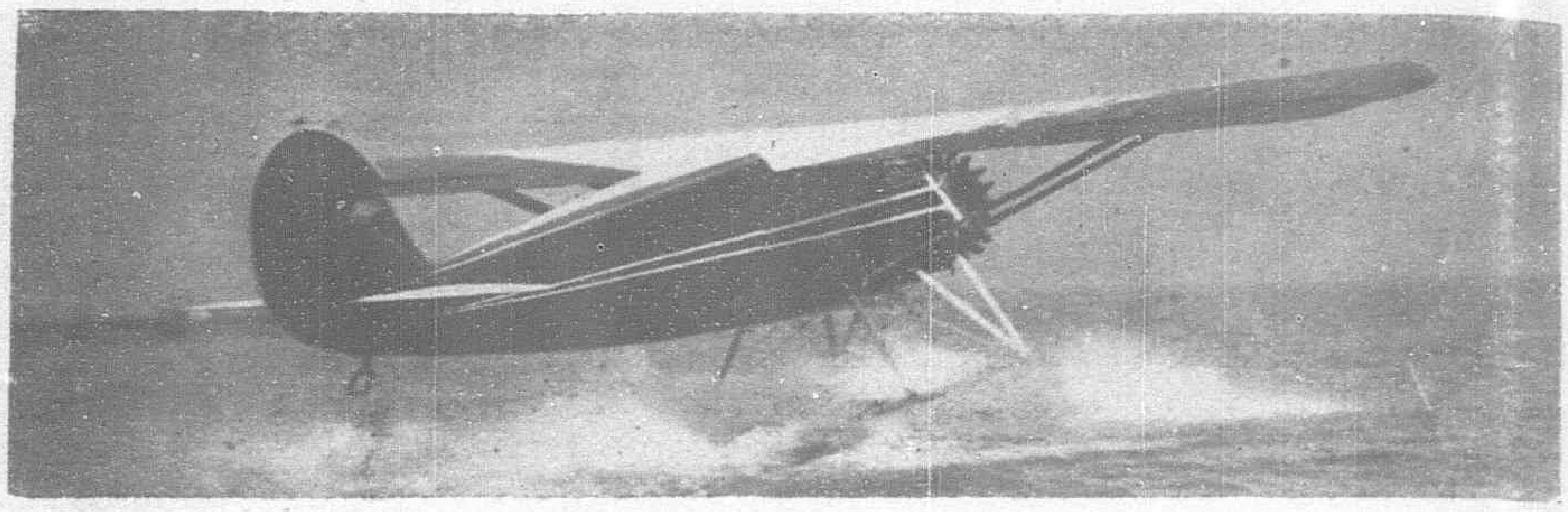
obtained by uniting, to a rigid sense of duty, the will and capacity for a wise preparation of things.

That is why, without minimizing the merits of the crews who have voluntarily and consciously confronted the greatest dangers, offering their lives to their country in an epic enterprise, praise should rightly be tributed to the young Minister of Italian Aviation for the splendid results secured.

H. E. Balbo can proudly feel that he has given his country an aviation organization that has no equal, both as regards men and machinery. He desired the honor of leading personally the daring group, knowing that even if he had comfortably remained in his Cabinet at the Air Ministry, he would equally have had the glory of the splendid enterprise, that has been carried out successfully thanks to the moral and material preparation organized by him.—Major Carlo de Rysky.

Aviation Progress in the Philippines

By PERCY WARNER TINAN, in the "Manila Bulletin"



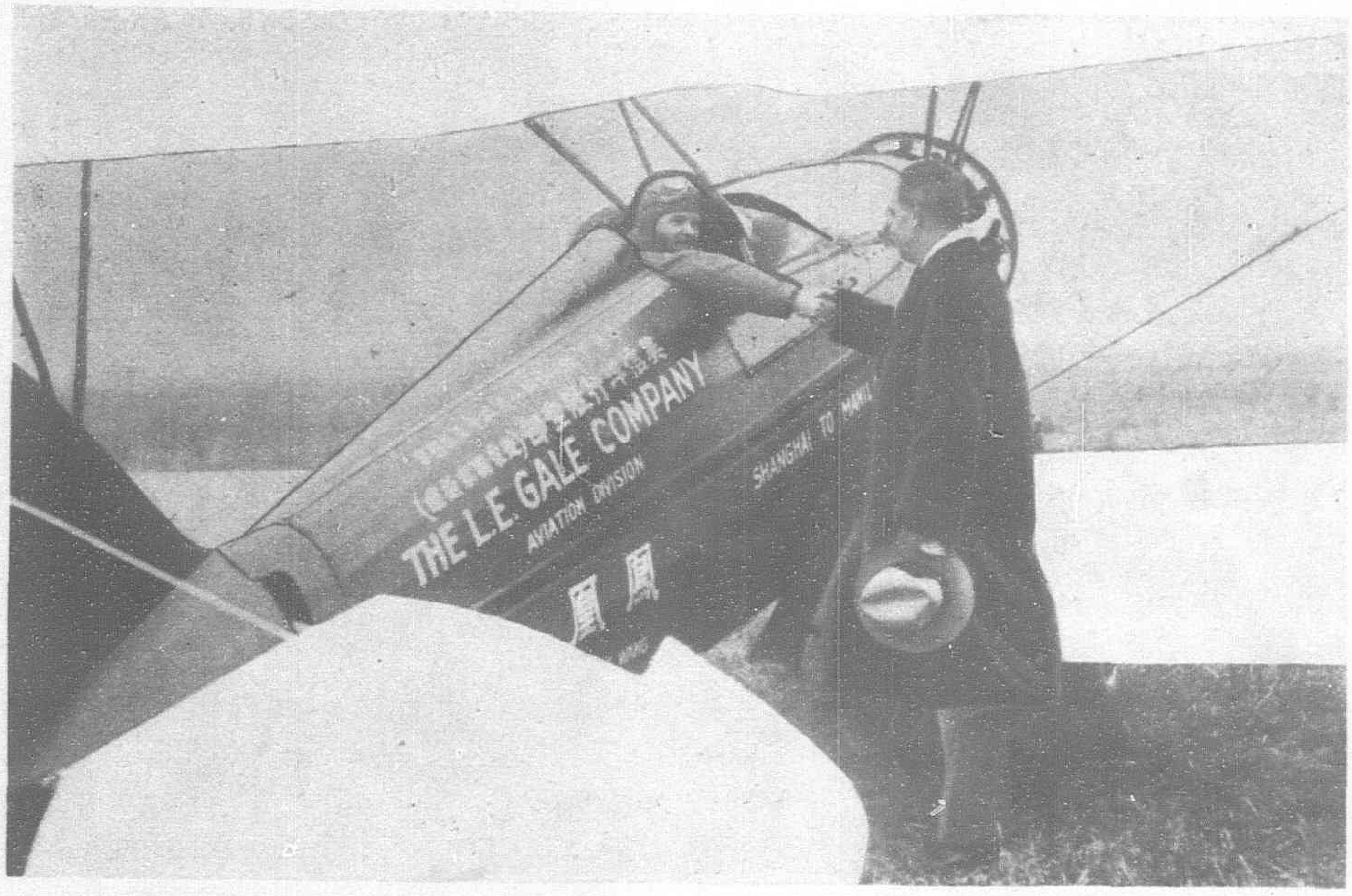
Type of Stinson Three Passenger Plane Purchased by the Philippine Aerial Taxi Company

THE early aviation events in the Philippine Islands were sporadic and almost entirely of an exhibitionary type. Among the first flights of which records are available were the aviation exhibitions during the Carnivals of 1911 and 1912 in Manila. Nearly twenty years ago, in January and February of 1911 a Mr. Mantel of the Scheide-Mantel Automobile Garage made several attempts to fly in an aeroplane which he had built himself, throughout, using largely bamboo and silk for his materials. Records of earlier attempts could not be verified as to date.

The first military aviation activities in the Islands had their inception at Fort Mills, Corregidor, in 1916 when a few amphibian planes were put into service. The entry of the U. S. in the World War the following year focused the attention of the War Department on more important subjects than Philippine aviation and little attention was paid to development here until after the war.

In 1919 both Camp Nichols, at Manila, and Clark Field, at Fort Stotsenburg, were established. The former has grown into a husky aviation field with commodious hangars, repair shops, headquarters offices, barracks, store houses, officers quarter and everything else that goes with the always efficient military posts. There has also been great progress at Clark Field.

With these two fields as a base military fliers have flown over the Philippines from Davao to Aparri, have photographed great areas and furnished the intelligence division with valuable information and data previously unobtainable.

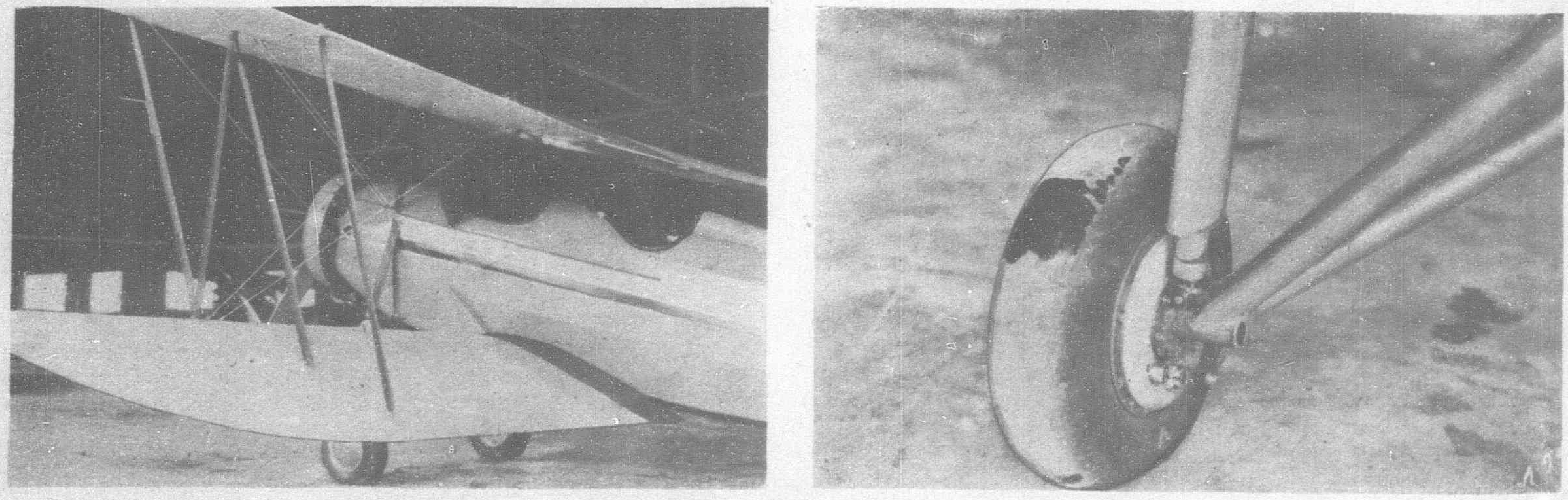


Pilot Brophy Starting on His Shanghai-Canton-Manila Flight in "The Feng Wang" (Phoenix) a Waco Two-Seater; Two of These Planes have been ordered by the Philippine Aerial Taxi Company.

During these flights a system of air ways has been mapped out for future development, that is, the establishment of emergency fields which would be of value in scouting expeditions, practice flights and available for more extensive immediate development and use in time of war. These fields will be known as auxiliary fields and will probably be located at San Jose, Minodor; Iloilo, Zamboanga, Jolo, Camp Keithly, Tacloban and Legaspi. This string would serve for expeditions to the Southern Islands.

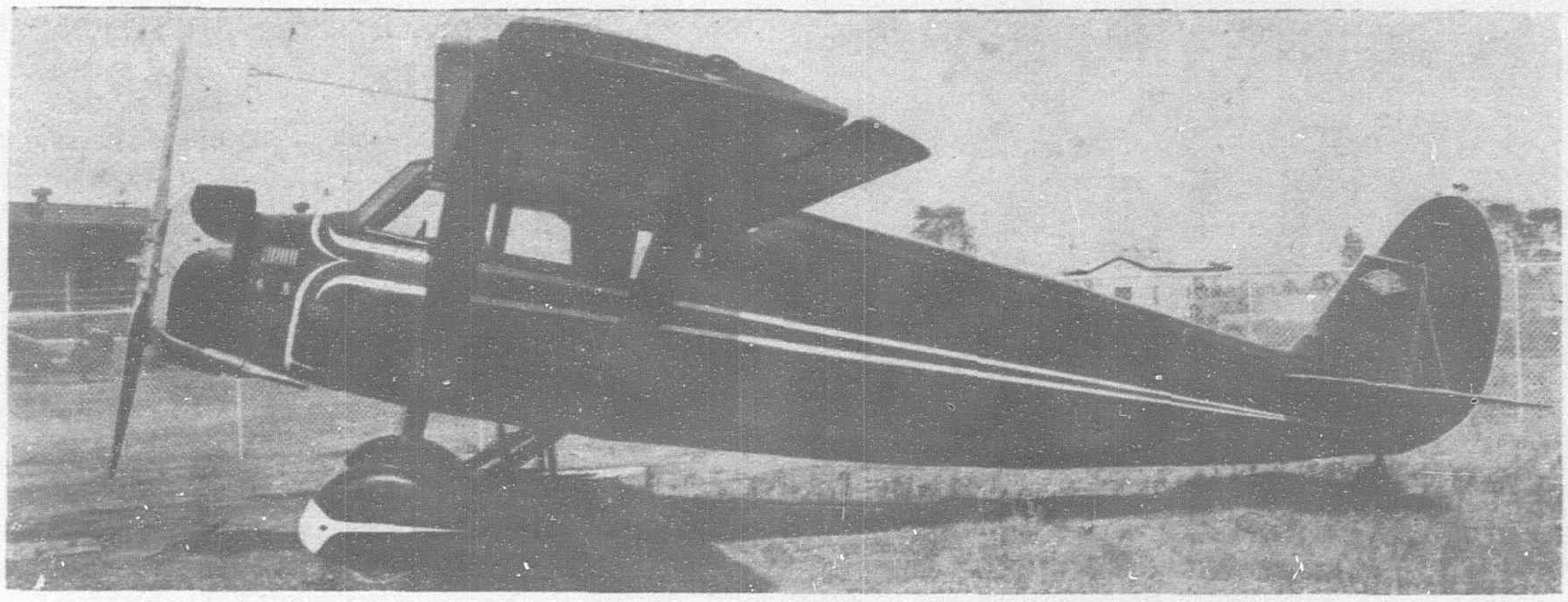
To the north there will be fields at Cauayan Aparri, Laoag, Vigan and San Fernando. There are no present plans for Baguio landing but it is understood that were the matter to come up the probable cite would be Trinidad valley.

In discussing the local aviation situation for this issue of the *Bulletin*, with officials of the army air corps, it was pointed out by those interviewed that there seemed to be a tendency already for property owners and real estate agents to dream of the money that they stood a chance of collecting for land for suitable landing fields, civil and military. That there was little hope of any such bonanza was the universal opinion of these officials. On the contrary, it was up to the municipalities to get busy and put themselves on the map with municipal landing fields for two reasons; first, that in no other way would they ever get them and second,



The Waco Two Seater used by Pilot G. W. Brophy, of the L. E. Gale Company, on the Shanghai to Manila Trail-Blazing Flight, equipped with Townsend Ring Air Cleaner Steel Propeller; Right Bendix Brakes and Oleo Shock Absorber that they could not depend upon military fields indefinitely even if there happened to be one in the vicinity. If they were to wait for the military to construct them, that "was something else already."

It was further explained, however, that the War Department always stands ready to render, as far as it is able and within the regulations of the service, aid, assistance and accommodation to civil aviation. Their own work and development must, however, be given the first consideration.



Type of Stinson Air liner used on the Passenger Services of the China National Aviation Company. Similar to plane purchased by the Philippine Aerial Taxi Company

Another point brought out by the military with reference to the future of commercial aviation in the Philippines was the reason for whatever success commercal companies may now enjoy in the U. S., *viz*, generous mail contracts which contributed largely toward operating expenses leaving passengers and express matter revenue available for possible expansion and dividends.

It was not thought that a direct government subsidy was a sound policy inasmuch as the average company would be inclined to take things too easy and show little or no interest in working out their own salvation.

Coming to actual commercial aviation in the Philippines the first concrete action was the formation of the Philippine Aerial Taxi Co., a few months ago by a public spirited and cosmopolitan group of prominent citizens more animated with civic pride than any idea of immediate dividends. As one of them is reported to have said:

"*Consider this subscription as my contribution to the good* of P. I. commercial aviation. I have already written off the amount."

"Action" has been the password of this new company since the first thought came to the instigators. Meeting followed meeting, the company was incorporated on November 28, the cables and radio waves were kept hot with inquiries on various types of planes and these inquiries were followed by orders the first of which will materialize to-day with the arrival of the first Waco plane. A Stinson will follow during the month, also a training plane, an American Clem.

No definite plans have been made for regular schedule or point to point operations. As soon as the planes arrive they will be manned by locally obtained pilots, if possible, and a "taxi" service will be inaugurated. If suitable pilots cannot be obtained locally they will be brought out from the United States or Europe but in either event the public will be assured of thoroughly competent operators.

In connection with local flights one of the first thoughts that comes to the mind of the public is Baguio and it is understood that for the present no effort will be made to secure a landing field at the mountain capital owing to possible difficulty from rain and fog. A site near the Camp One-Damortis highway, as near as possible to the former point, is more to be desired as the departure of planes from Manila could be timed with the departure hour of the B. A. L. busses from Damortis for Baguio. At some future date Trinidad valley will be considered as a landing field.

Service will be inaugurated with two types of planes.

One of them will be a Stinson, with a high speed of 115 miles per hour, cruising speed, 100 miles. It will be equipped with a Lycoming motor, detachable pontoons for use in water flights and capable of 600 mile trips on one filling. Passenger capacity, exclusive of pilot, is three. An altitude range of 14,000 feet will enable it to cross any Philippine mountain ranges with ease. A feature of this plane is its entirely inclosed cabin, shown in the accompanying illustration, which resembles the rear compartment of a luxurious sedan.

The manufacturers of these planes, the Stinson Aircraft Corporation of Wayne, Michigan, have recently entrusted their Far Eastern business to Pattison and Machlee, who have established their headquarters in Shanghai.

The other two planes will be Wacos, with open two passenger compartment and a cruising speed of 120 miles per hour. They will carry the famous Wright whirlwind motors and have a single flight range of 680 miles.

With the launching of commercial aviation comes the subject of landing fields and the question now is whether the Philippines are going to rise to the level of other countries in the preparation of municipal landing fields. It is conceded that those cities which take the first step in this direction will be sure to benefit therefrom both in publicity and increased business and the arrival in Manila last month of a commercial traveller who brought his own plane with him, a Stinson of the type ordered by the local company, will bring the present lack of landing fields directly into the limelight.

It has been suggested that an up-to-date municipal air field in Manila would not be amiss as another wedge in the propaganda barage that is being made to bring the city to the eyes of the travelling public.

The Philippine Aerial Taxi Co. plans for the future include a service to the China coast, which would be most welcome to the business community as a means of giving last moment connection with steamers that had already left Manila with European and American mails.

Industrial Development of Sakhalin Island

The newly organized Soviet state company for the development of Sakhalin Island has recently started a number of important projects. Towards the end of 1929 the entire population of Sakhalin was 22,500, of whom 10 per cent were of the northern minor nationalities. The Company is now colonizing 10,000 new settlers, mainly builders, miners and fishermen, recruited from various parts of the Soviet Union.

Special attention is being devoted to the development of agriculture, lumber, and the fishing industry. Until now agriculture was hardly developed on the island; meat, vegetables and hay being to a great extent imported from Vladivostok. At present four large state farms are being organized in Sakhalin, which were to have in the fall of 1929-30, 10,000 hectares of land and to produce 300 tons of potatoes and other vegetables, aside from dairy and meat products.

Considerable development is expected also in the lumber industry. The Sakhalin Company has already begun the construction of two large lumber mills, a veneer factory, a barrel and box factory, and a tie mill. In 1928-29 Sakhalin produced only 600,000 cubic feet of pulpwood, but last year timber cuttings were expected to amount to 10,000,000 cubic feet. A large cellulose plant was nearing completion in 1930.

The fishing industry on the island is considerably developed, and with the beginning of the activity of the new Company it is assuming greater importance. As against the 1,700,000 roubles worth of fish products produced in 1928-29 the output in 1929-30 was worth 8,000,000 roubles.

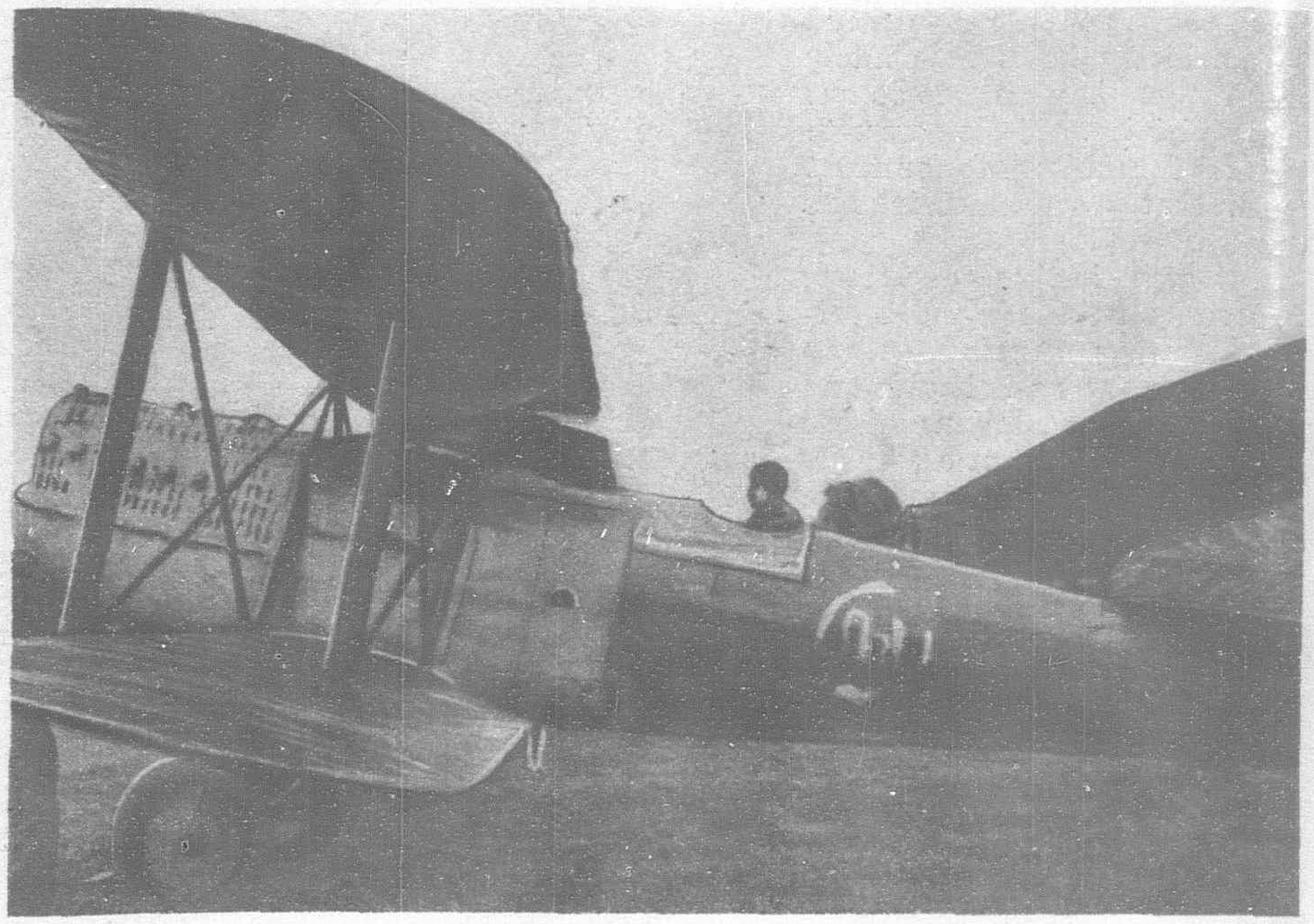
Preliminary operations for the exploration of coal and oil deposits on Sakhalin Island are now being carried out, and some mines are being prepared for exploitation. Other developments include the construction of 600 kilometers of dirt roads.

Siam Closing the Sky

Service Over Difficult Country Between Burma and Indo-China Will Make Possible Air-Sea Circuit of Globe in 35 days

By DON C. WILEY, in The New York Times

THE final link in what amounts to an unbroken thirty-five day sea and air service around the world will be forged early in the Spring of 1931 when the Aerial Transport Company of Siam, Ltd., just organized here under the technical supervision of a pioneer of the United States Air Mail, begins weekly operations across the 1,500 kilometers (937 miles) of mountains, jungles and rice fields separating Rangoon, British Burma, and Hanoi, French Indo-China. The planes of the new company, with a maximum speed of 145 miles an hour, will make the trip in about twelve hours.



Major-General Phya Chalerm Akas, Chief of the Siamese Aeronautical Department Starting on a Good-Will Flight to Hanoi, Indo-China

The closing of this gap, which hitherto has constituted a serious obstacle in the way of direct aerial communication between Europe and the great ports of China, will enable the ordinary traveler to circle the globe at any time of the year, and on regular weekly schedule, in a total of thirty-five days. In addition, it will place New York closer by five days to the Philippine Islands, *via* Europe, than across the Pacific.

Operation of a regular aerial service across Burma, Siam and Indo-China will speed up communication among a dozen different countries of Europe and the Far East.

Rendezvous of Winds

The mountains of Burma and Siam are the meeting place of the winds from the Bay of Bengal and those which sweep down from the snowclad Himalayas. Here the great Dieudonne Coste was forced down in 1927; here Airman Eric Hook went down to his death a few months ago in an attempt to fly from London to Australia; here the daring Amy Johnson barely escaped disaster when her plane was tossed about by the maelstrom of winds. Yet by the adoption of modern methods now used by the major airlines in the United States and Europe the Siamese organization believes that it can make the route as safe as any in the world.

Creation of this company is largely due to the efforts of his Royal Highness Prince Purachatra of Kambaeng Bejra, Minister of Commerce and Communications of Siam, who, as a General in 1914, introduced aviation into the Siamese Army. The technical details of the new air route were worked out by Otto Praeger, adviser of the Siamese Post and Telegraph Department, an American, who, as Second Assistant Postmaster General at Washington, started the United States air mail in 1918 and directed its operations between New York and San Francisco and Minneapolis and St. Louis for its first 1,500,000 miles of flying.

All pilots will be required to fly at a height of 6,000 feet in order to safely clear the two storm-topped mountain ranges on the route. Thus, planes will be within easy gliding distance of a landing field at nearly all times. In addition, Mr. Praeger has worked out with the weather bureau of the Siamese Government a method whereby hourly weather reports will be received by radio by the pilots of the planes. This arrangement of ground facilities permits the use of single-motored planes, thus insuring the most economical communication through a close adjustment of pay-load capacity to horsepower.

Route of New Line

From Rangoon the planes will cross the bay made famous by Rudyard Kipling and skim over the historic pagodas of Moulme on the eastern side of the bay. The first stop will be at Mensord, on the Siam-Burma border. From there the planes will hop a 3,000-foot mountain range and land at Pitsanuloke, a station on the northern route of the Siamese State Railways. Here, mail from Malaya and Siam will be taken on. The next leg of the route is from Pitsanuloke to Udorn, traversing another mountain range and part of the Siamese plain, which is given over entirely to the cultivation of rice. From Udorn the planes will hop to Nakon Panom, a town on the border between Siam and Indo-China; thence they will fly north-eastward to Hanoi.

Because the Siamese Government has realized the value of frequent aviation fields in time of war the transport company will be able to use seven military landing fields especially built along this route. In cases where mountains are to be crossed emergency fields are located directly at the base on each side of the range, thus virtually assuring a safe landing. The runways on all of these emergency fields will be raised above the surface of the surrounding country to eliminate the danger of flooding, and even at the most obscure points in the jungles caretakers and mechanics will be constantly in attendance.

The ships of the Siamese company will be operated by Siamese army-trained pilots and mechanics. These men, having served their required time with the army, are now civilian reservists, and have been operating an air-mail service to the northern districts of Siam for eight years. During that time there never has been a fatal crash and only two men have been injured in accidents.

Makes Service Continuous

An idea of the tremendous saving in time to be effected by the new airline may be gained from the fact that to reach Hanoi from Rangoon one must now take a steamer from Rangoon to Bangkok, thence travel to the Siamese border by train, transfer to a motor bus to Saigon and then take a small coasting ship to Hai-feng and Hanoi. The trip also may be made by motor from Pitsanuloke to Hanoi in eight days, but only in the dry season. The planes will fly from Rangoon to Hanoi in less than one day!

Far more important, however, than this saving of time in this section of the world is the direct connection the new line will establish with the great aerial services operating from Europe to Far Eastern points. The Dutch Air Mail has already begun operations between Amsterdam and the East Indies, with Rangoon as one of its most important stops.

Here the Siamese planes will pick up passengers and mail and whisk them to Hanoi. There the Siamese planes will be met by a flying boat service which the British authorities will have already inaugurated between Saigon and Hongkong. By air Hongkong will be but a day from Hanoi, a trip that now takes

Handley-Page Four-Engined Forty-Seater Passenger Biplane for the Imperial Airways Trans-Asiatic Service

four and a half days by boat. In addition the National Government of China plans to operate a regular airline between Canton (less than an hour by air up the river from Hongkong) and Nanking (only an hour by plane from Shanghai).

Globe Circling Schedule

With the closing of the Burma-Indo-China gap it will be possible for a traveler, or a letter, to leave New York by fast Atlantic liner and arrive in Southampton or Cherbourg five and one-half days later. Transferring to plane, the traveler can reach Rangoon in nine days. The trip from Rangoon across Siam and up the coast to Canton or Hongkong will require two days more and another day will be taken up by the aerial trip from Canton to Shanghai. Fast trans-pacific liners make the trip from Shanghai to Seattle or Vancouver in sixteen days and from Seattle to New York is a trip of a day and a half by the United States Air Mail. Therefore, the traveler can be back in New York in thirty-five days.

The fast route to Manila from New York by steamer and plane now is twenty-three and a half days. Going from New York to Seattle by United States Air Mail requires one and a half days; from Seattle to Hongkong by steamer is twenty days and from Hongkong to Manila by steamer is two days. The schedule by the Dutch-Siamese or by the French-Siamese airline will be as follows: From New York to Paris by steamer and Cherbourg air line, five and a half days; Paris to Rangoon by Dutch or French line, nine days; Rangoon to Hongkong by Siamese airline, two days; Hongkong to Manila by steamer, two days, making a total of eighteen and a half days. In this way five days is saved between New York and the Philippines.

International Relationship of Minerals

Sir Thomas Holland, who during the World War was Chairman of the Indian Industrial Commission and President of the Indian Munitions Board, and is now President of the British Association for the Advancement of Science, in an address in "The International Relationship of Minerals," invites attention to China's lack of basic minerals as a reason why the West has nothing to fear from her industrial development.

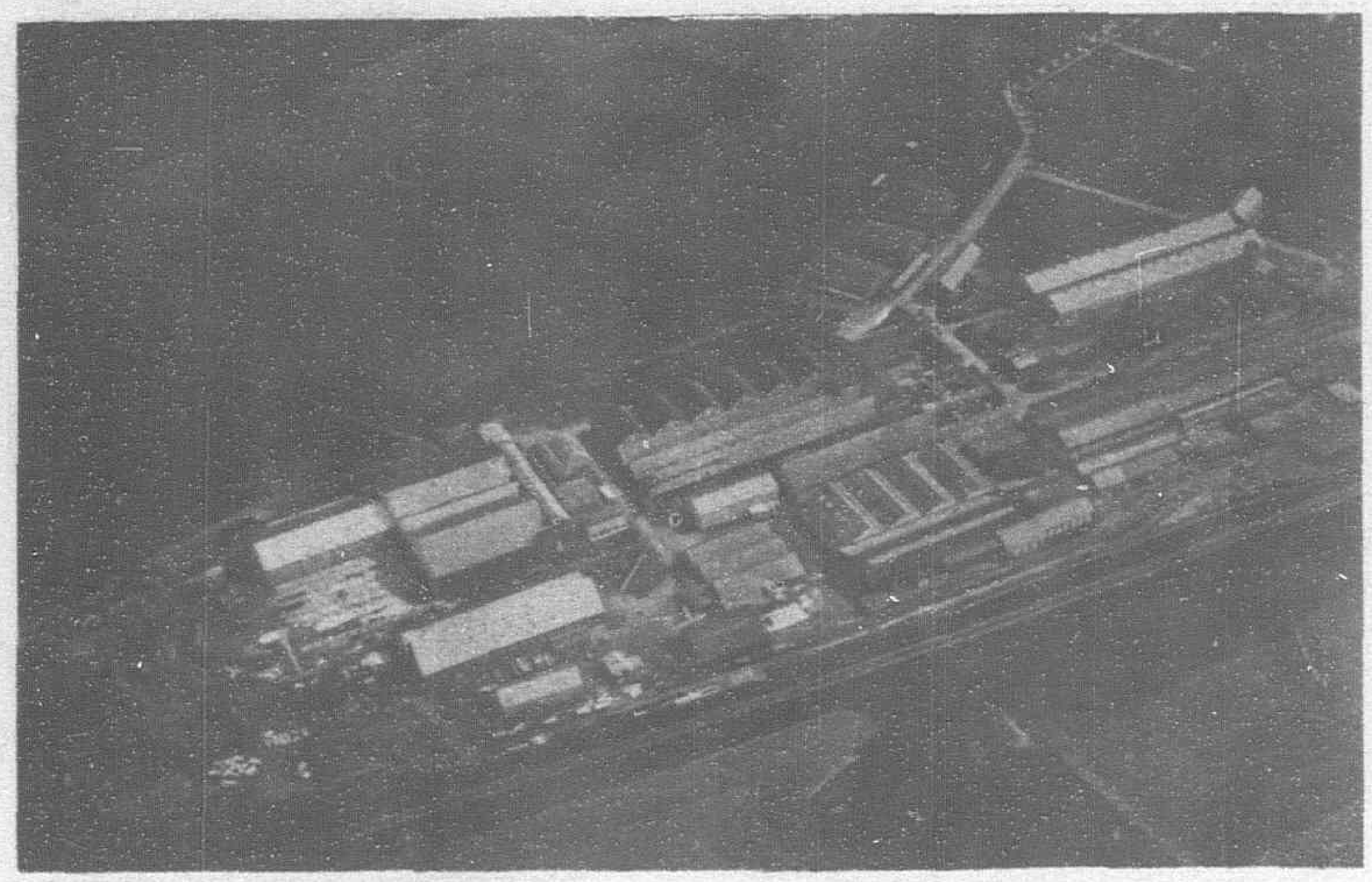
"It is now misleading to speak of the wide distribution of minerals within a country as we could have done some fifteen years ago; we must now rule out the smaller deposits, and so form a new picture composed of those concentrations that are on a scale sufficient to support modern metallurgical units.

For this reason it is necessary to review afresh the resources of the undeveloped Far East, which has for many years been regarded as a menace to western industrial dominance. The vague general notion that mineral deposits are evenly distributed throughout the Earth's crust has fed the impression that the development of China, which is much larger than the United States, may yet shift the center of industrial gravity when her great population becomes awakened and organized by western technical science.

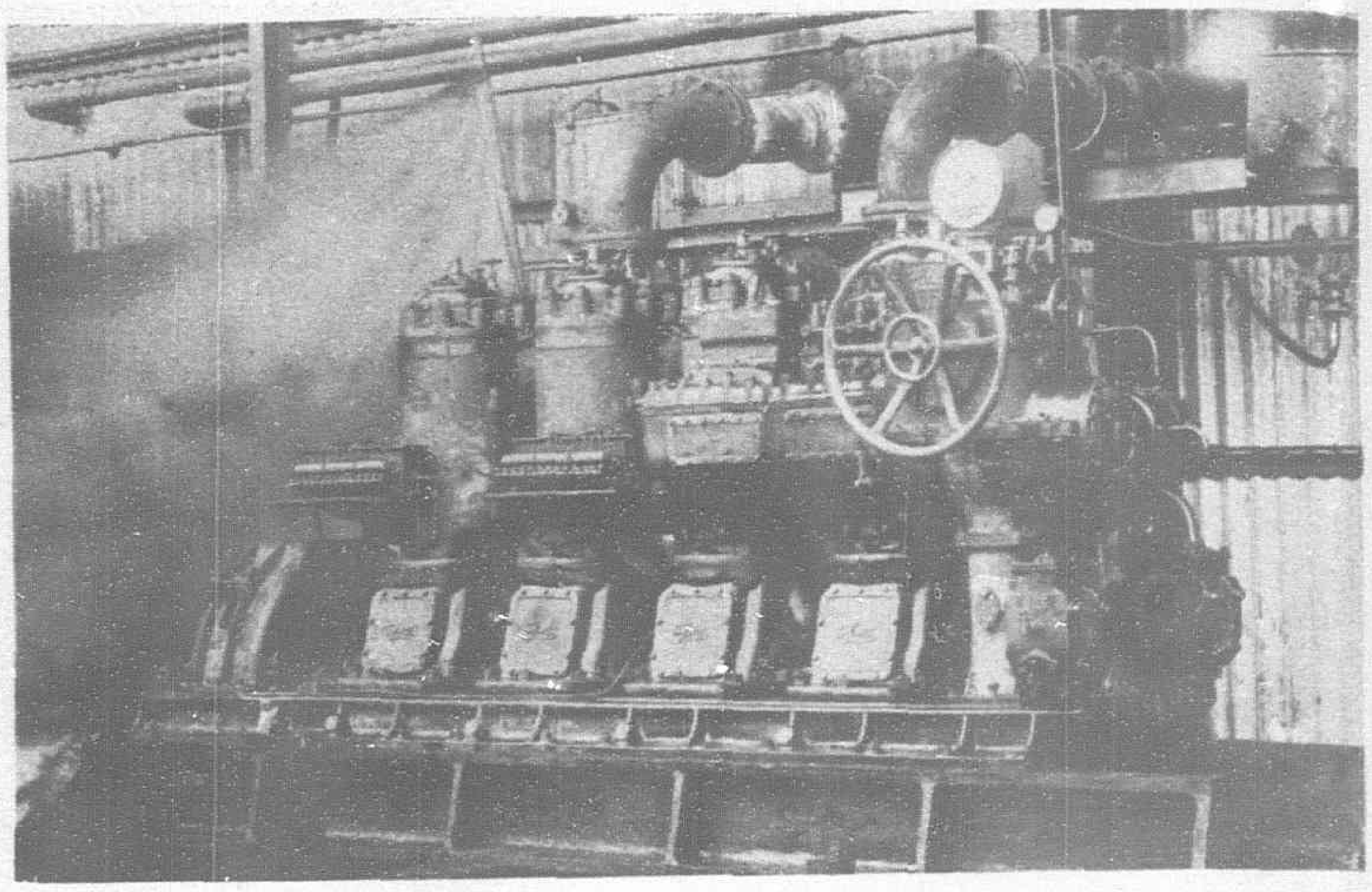
"It is true that the people of the East are rapidly adopting the methods and using the mechanical facilities of western nations—railways, telegraphs, power factories, steel ships and other metal-consuming devices; but the critical investigations made by mining geologists, especially since the War, tend, with a striking degree of unanimity towards recognizing the remarkable circumstances that China, as well as other countries of the Far East, is deficient in those essential deposits of minerals on which our mechanized form of civilization is based.

"When China was still an unknown land it was possible for after-dinner speakers to impress non-critical hearers by talk of the "yellow peril" and the "challenge of Asia;" but these expressions have been used without thought of the circumstances that natural resources in minerals now sets a rigid limit to power, whether industrial or military. We have known for some time of the natural limitations of India, of Japan and of smaller political units in the East; but until very recently we have had insufficiently precise data for estimating the quantitative value of the terms "vast" and "unlimited" which have been so often applied to China. Assuming that China may yet become a homogeneous national unit, or even assuming that her resources may become developed by Japanese energy, there is very little doubt now that, as an industrial area, the country is deficient in those minerals that form the essential basework of the modern form that civilization has definitely taken.

"And the obvious limit in development, as defined by local natural resources, can be extended only to a limited degree by the importation of raw materials from other areas; for a country can buy metals only by the exchange of other products; its buying powers are limited by its selling powers. Abundant cheap labor, assisted by a semi-tropical climate, can produce an exportable surplus of food stuffs only in limited parts of the Far East; even the so-called luxury products, which to our early navigators formed the inspiration of what we call geographical research, are now obtained elsewhere, and some are being replaced by artificial products evolved from the chemical laboratory.



Aerial View of Petters Works



T.4014 Four Cylinder 160 b.h.p. Marine Atomic Diesel Engine

A British Aircraft Factory

The Works and Products of Petters Limited, Yeovil

The engine business of Petters was founded in 1895, when the brothers Petter (Sir Ernest W. Petter, now Chairman of the Company and Mr. P. W. Petter, Vice-Chairman), became interested in internal combustion engines, particularly with a view to their use for road carriage propulsion.

Those were the days of the red flag signal, and the first car which they made in 1895 was only allowed to run without that safety precaution, by special permission of the police, between the hours of six and eight o'clock in the morning. This particular car was one of the first, if not the first internal combustion engined motor-car made in Great Britain. The manufacture of motor-cars was continued for some time but the business in stationary engines developed more rapidly and ultimately the manufacture of motor-cars was discontinued.

The business having out grown its original works, known as the Nautilus Works, in 1912 a large site was purchased on the outskirts of Yeovil and the first buildings were erected on the site now known as the Westland Works. The whole site, which includes the aerodrome, exceeds 100 acres in extent, and the actual area covered by the buildings is approximately 10 acres.

Up to 1910, engines of four-stroke cycle only had been manufactured. but in that year the first Petter two-stroke-cycle engines were placed on the market, and in 1915 the Directors were so convinced of the superiority of the two-stroke-cycle that they determined to discontinue the manufacture of four-stroke-cycle engines altogether.

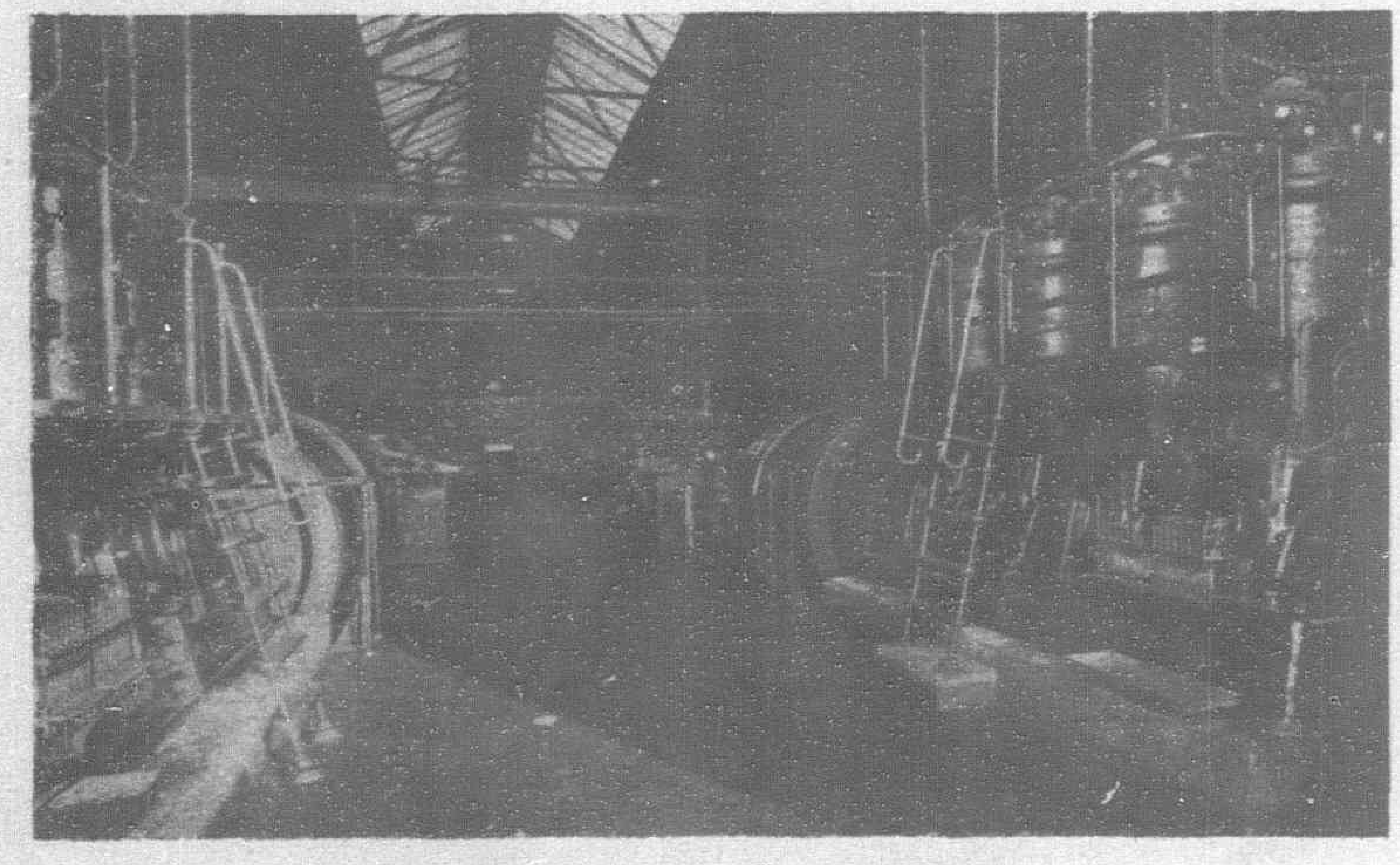
The engines now manufactured are divided into three classes:—

1. Small engines, with magneto ignition, made in sizes from 1½ to 5 b.h.p., largely used for agricultural work, pumping, etc.
2. Hot bulb or as they are preferably called, surface ignition engines, made in sizes from 5 b.h.p. to 36 b.h.p. (Formerly engines of this type were always started with a blow lamp of the Swedish type, but in 1923 the patented method of cartridge ignition was introduced which considerably helped the development of the Company's business).
3. Airless injection engines of the Diesel type which are now being manufactured in sizes from 25 b.h.p. to 400 b.h.p., with from one to six cylinders. The heavy engine department in which the larger size engines are made was erected in 1928.

The Petter-light electric lighting plants for farm, home, shop and factory, are made for outputs from ¾ to 3 kw. with or without automatic control. Larger sizes up to 270 kw.

Many thousands of Petter oil engines of various types have been made for use all over the world. They have been supplied for the estates of His Majesty, the King, His Royal Highness the Prince of Wales, British Government Departments, Dominion Governments, Foreign Governments, Municipalities and Railway Companies. Petter engines are in constant use for tea and rubber estates, mines, oilfields, irrigation and drainage works, water supplies and generating stations.

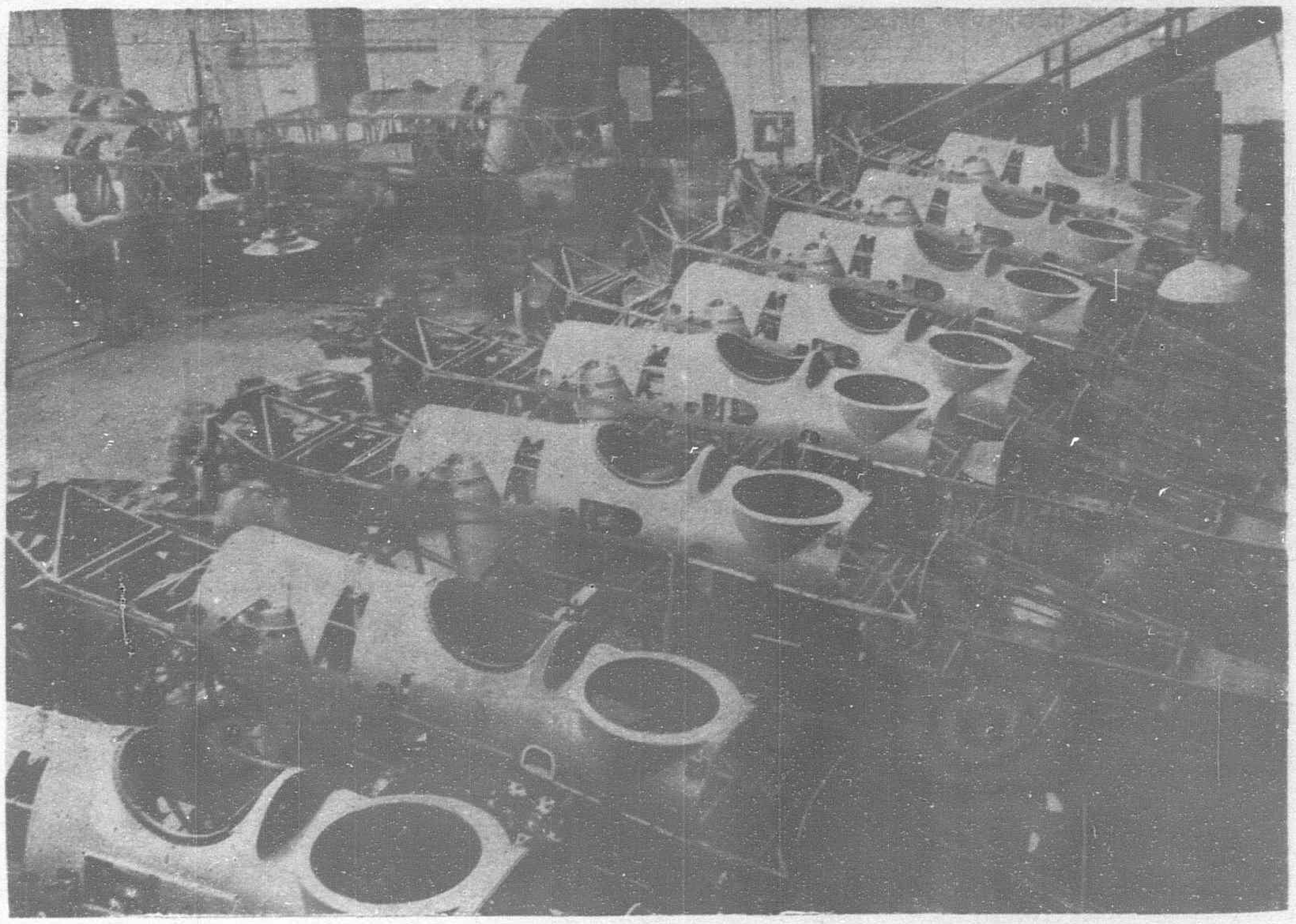
To provide power and light for the works supply at Yeovil, the power-house is equipped with engines made by the firm which total 1,900 b.h.p., the electrical output from these being approximately two million B.O.T. units per annum. The foundry at Yeovil is one of the largest and best equipped in the south of England, and among the numerous hydraulic moulding machines to be seen in this section is one of exceptional size with trunk-like



The Power House, Petters Works

Engine Erecting Conveyor, Petters Works

sand-feeding arrangements which is used for the filling and ramming of moulds with special rapidity. The machine shops in the engine factory, three in number, are also equipped with modern tools which allow of high output as well as maximum accuracy and interchangeability. The first machine-shop is engaged in handling the parts required for "Universal" oil and petrol engines, surface-ignition cold-starting engines, and small components for Atomic Diesel engines. The second machine shop deals also with such work, as well as with parts for aircraft. The third, or heavy machine and erecting shop, is confined to the production of Atomic Diesel engines. This building, 332-ft. long and 110-ft. wide is divided into two bays, one for machining and one for erecting and testing.

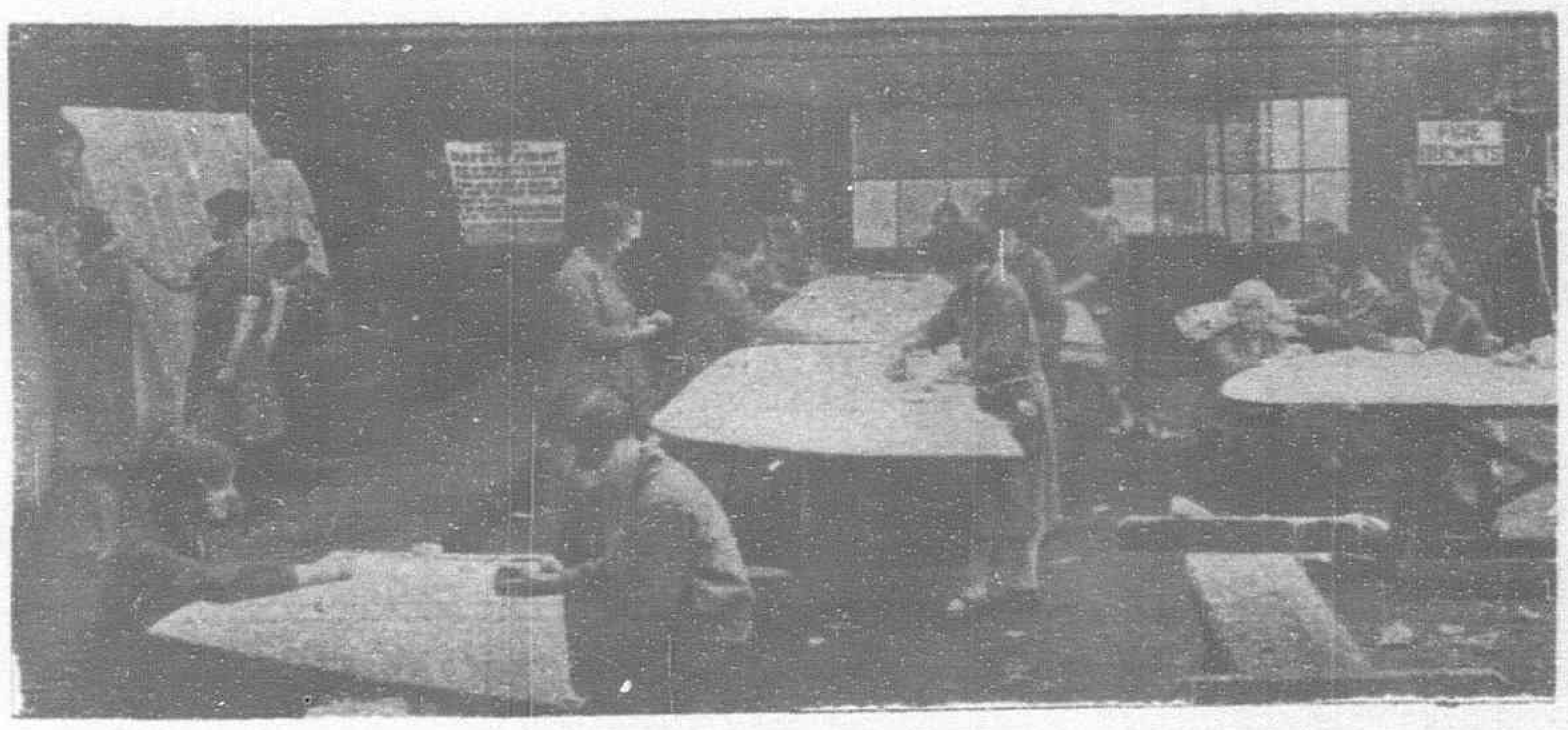


"Wapitis" in Production at the Westland Aircraft Works, Yeovil, England

Fuel pumps for all types of engine, and atomizers for the Diesel engines, are produced in a further department, where machinery is installed for producing these components to a special degree of accuracy. Calibraters for mechanical lubrication from 1 to 16 feeds are assembled here and tested under service conditions. A small engine department deals with the construction of engines up to 8 h.p., components such as pistons, air valves, fuel chambers and governors being sub-assembled complete before they are handed over to the erection gangs. The engines are built on a conveyor, the speed of which is increased according to the size of the engine being handled. From this conveyor the completed units are carried by a roller conveyor to the test beds. In a larger erecting shop engines from 12 to 36 b.h.p. are dealt with, also on a conveyor.

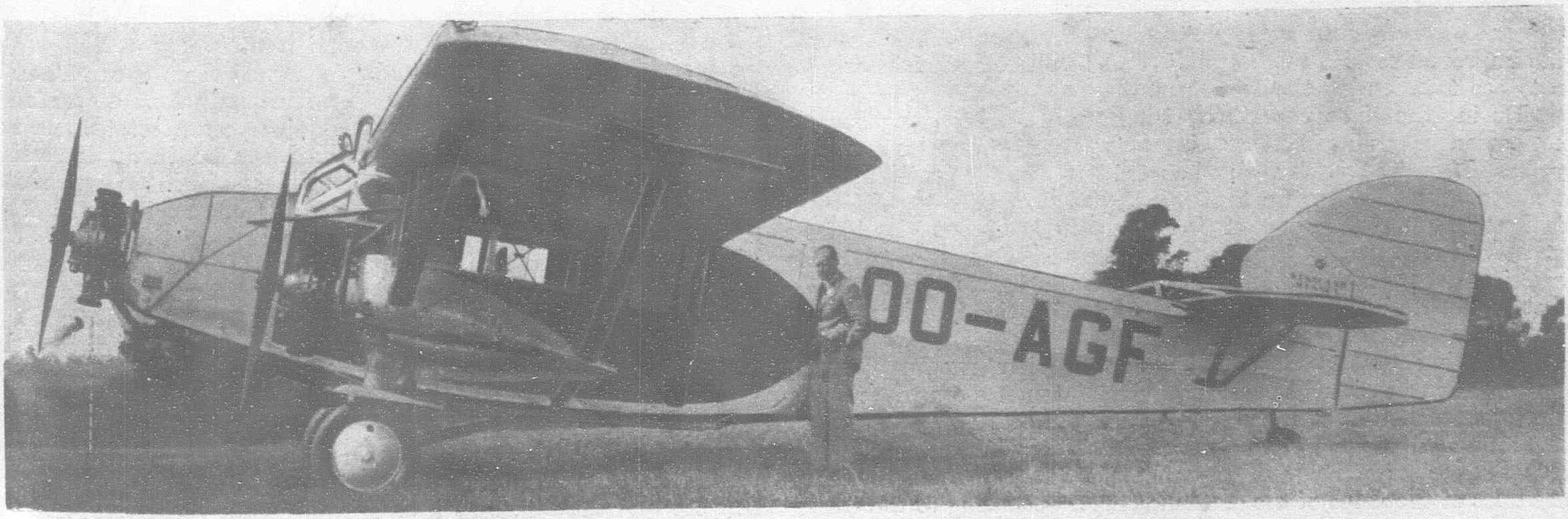
Export Consignments

Among a variety of typical engines and equipments supplied for export during this year are two 65 b.h.p. Diesel types shipped for service in an important waterworks in the Argentine, in which country Petter power units are used extensively. Three large electric generating plants have been consigned for Government work in Madras, and a 260 b.h.p. Atomic Diesel engine has been dispatched to China. This latter unit is installed near Hong Kong, and drives coal-briquetting machinery. A further order has been received from the same source for a similar engine of 160 b.h.p. Two other engines of this heavy-oil type, each 50 b.h.p. and driving a 30 kw. generator, have been dispatched this year for installation on the Canadian boat *Cementkarrier*. These marine sets are to work under arduous conditions where a large degree of rolling is experienced, a total angle of swing up to 70 degs. being at times encountered.



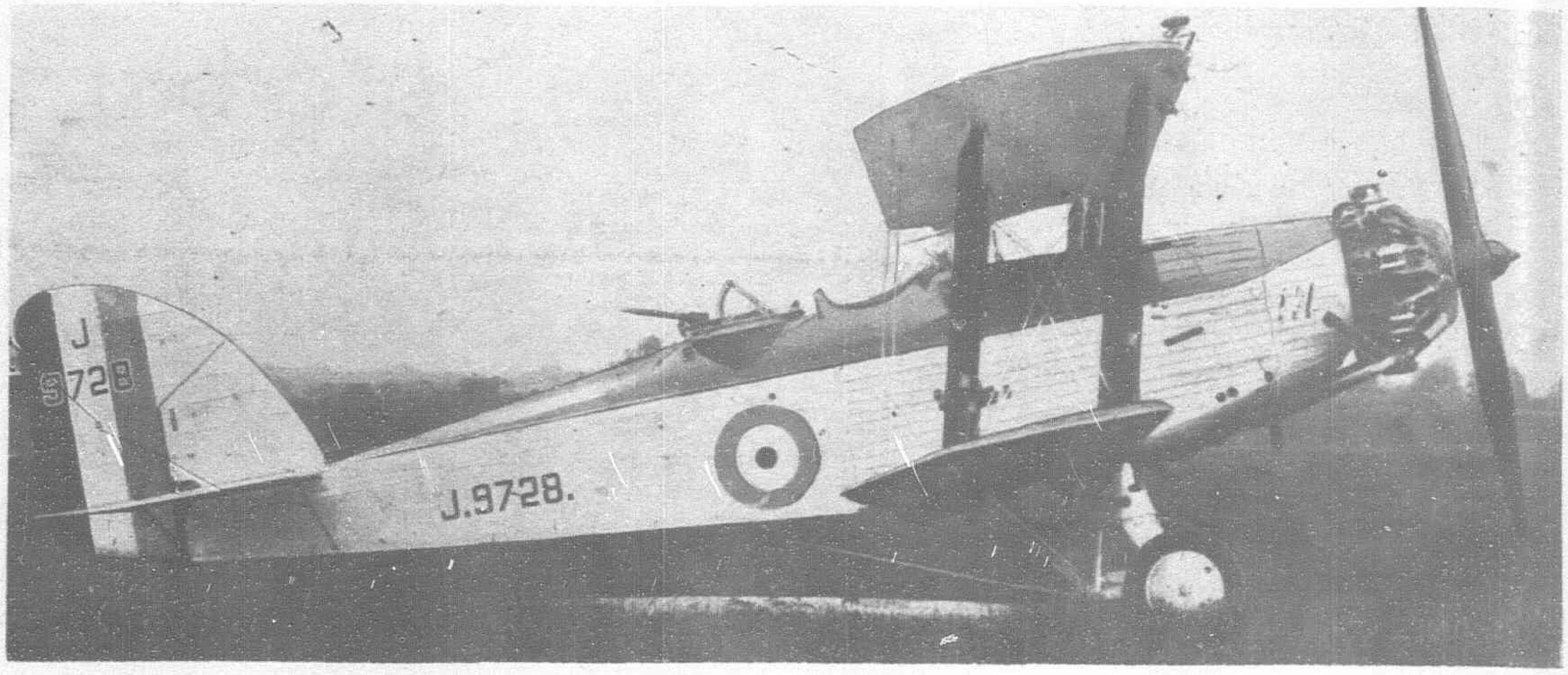
Covering Wapiti Wings

Messrs Petters are convinced that the Atomic Diesel engine is one of their most important modern products which, upon a revival of trade, will be widely adopted in the future. During this year the engine has been tested and favorably reported upon by Mr. W. A. Tookey, the well known consulting engineer and expert on internal combustion equipment. It has been proved by these tests and in daily commercial service that this latest two-stroke engine, when compared with the four-stroke



The Westland "Wessex," Six Passenger Cabin Monoplane Fitted with Three Engines

design, is the equal of the latter type in lubricating oil consumption, and superior in fuel oil consumption over a period of time; that it is less liable to breakdown from all contingent causes, and less costly in maintenance and attendance charges.



The Army "Co-operation Wapiti With Long Fuselage, Braked Chassis, Tail Wheel, etc., Fitted With Jupiter VIII F. Engine

Westland Aircraft

The Westland Aircraft Works, which is a branch of Petters Ltd. adjoins the engine factory and has an extensive aerodrome immediately attached, enabling tests to be carried out with maximum facility. This section of the firm's activities was inaugurated in 1915, and during the War was engaged in the supply of many hundreds of fighting machines for the various fronts. It has now developed into an important industry for the supply of military, civil and commercial aeroplanes.

Among machines which are in production is the "Widgeon" IIIA type, this being a two-seater light monoplane fitted with Cirrus III, Gypsy or Hermes engine, which is ideally suitable for the private owner or flying-club use. Metal construction is largely adopted on this design, and the wide divided axle type of undercarriage gives special taxying stability.

Another type of machine, the "Wapiti IIA" with Jupiter VIII F or alternative radial engine, is a two-seater general purpose military aircraft, for reconnaissance, bombing, photography, wireless, long range desert patrol, and advanced training.

The "Wapiti" types include also an Army co-operation machine, a general purpose model giving the wide range of c.g. and other requirements necessitated. It was a slightly longer fuselage, a new type chassis with wheel brakes, a tail wheel and other installation modifications.

The "Wizard II" is an all-metal high-speed single-seater fighter, parasol type monoplane, with Rolls Royce F.XI.S. engine. This design has a high performance at altitudes with low landing speed, its armament consists of two enclosed guns firing forward, and wireless and oxygen apparatus are fitted.

The "Interception Fighter" with Bristol Mercury IIA engine is an all-metal fast-climbing single-seater low-wing monoplane, providing a complete view forward and upward.

A final type which might be specially mentioned is the "Wessex." This is a 3-engined 6-seater high wing enclosed cabin monoplane, fitted with three Genet Major engines. It has luxurious cabin accommodation for four passengers, with a seat for an additional passenger or navigator beside the pilot in the enclosed cockpit, and additional seats can be installed. The machine, which will maintain height on any two of its engines, caters for air lines serving as feeders to main-track routes, or for the private owner.

Experimental work is being vigorously carried out on special types of aircraft, such as the "Pterodactyl" a tailless pusher monoplane which is notably original in design and possesses special controllability and unobstructed vision.

About 2,000 workers are employed at Westland in the Engine and Aircraft Departments. The Westland Aircraft Society, which is a branch of the Royal Aeronautical Society, is a very vigorous body and during the session lectures on subject of aeronautical interest are given by leading experts in the aeronautical world.

Various sports clubs are in existence and part of the aerodrome is used by these. A well equipped canteen is provided for use of the workers, and there is a surgery with two trained nurses attached to the organization.

Pacific Steamship Combine

During the past month the main details of the consolidation of interests of the Los Angeles Steamship Company with those of the Matson Navigation Company of San Francisco, have been completed.

This pooling of resources—of ships, of men, of good-will and of finances—has been carried out as an economic measure to provide improved service to the public and to all communities whose ports are touched by the two lines.

During the eight years in which Lassco has been engaged in the passenger and freight service between Los Angeles and the ports of Hawaii, this company has built up a very gratifying demand for its facilities. In that same period of time the Matson Navigation Company, of San Francisco, in keen but closely cooperative competition with *Lassco*, has embarked upon a ship construction program which, when completed, will most adequately meet travel demands to all ports covered by the two lines with the finest of modern ships on the Pacific.

Realizing that a competitive construction program could only result in increased operating and maintenance expense finally to be met by the traveling public, the directors of the two companies felt it would be wise to consolidate their interests, pooling all resources of ships and organizations and arranging sailing schedules of the ships of the combined fleets according to the travel demands.

For nearly half a century the Matson Line has served Hawai from the port of San Francisco, and has stablished through that port a large passenger and freight business not only with Hawaii but, more latterly, through the Oceanic Line, with the South Seas and Australia.

Of recent years that entire section of the state known as Southern California and stretching generally from Santa Barbara to the Mexican line, has come to be recognized as a wonderful playground for the people of the Middle Western States and the eastern seaboard. This condition has resulted in an increasing trend of travel to Los Angeles and in a consequent growth of importance of the port of Los Angeles for trans-Pacific sailings.

In addition to her present fleet, headed by the new *Malolo*, Matson's ship construction program now involves approximately $24,000,000 for three ships being built at east-coast yards for service from California to Hawaii, the South Seas and Australia. The first of these new ships will be commissioned early in 1932, and shortly thereafter all three of these great modern liners will be providing Hawaii and beyond with exceptional facilities.

The immediate result of the merger will slightly more than double the present passenger facilities between the ports of Los Angeles and Hawaii, and this will be further increased with the advent of the new liners.

New Public Utility Franchises in the Philippines

The Philippine Legislature during its last session passed acts granting 50 year franchises to install, operate and mintain electric light, heat and power plants to the following:—

1. Misamis Lumber Company, for the municipalities of Misamis, Clain and Tudela, Province of Occidental Misamis.
2. Jose A. Rigotti for the Municipalities of Virac and Bato, Province Albay.
3. Butuan Saw Mill, Inc. for the Municipalities of Jimenez, Occidental Misamis and Maasin, Leyte.
4. Martano Cabales for the Municipality of Ibayay, Capiz Province.
5. Jolo Power Company, Inc. for the Municipality of Jolo, Province of Sulu.
6. Cacho and Hidalgo for the Municipalities of Pagsanjan, and Lumban, Laguna Province.
7. Vicente A. Racaza for the Municipality of Barili, Cebu Province.
8. Lino Gomez for Silang Municipality, Cavite Province.
9. Fausto Guillen for Municipality of Escalante, Occidental Negris.
10. Consuelo D. Borga for Municipality of Iligan, Lanao Province.
11. Imus Electric Co., Inc. for the Municipality of Bacoor, Cavite Province.
12. Adrian Campos for the Municipality of Hinigaran, Occidental Negres.
13. Bartolome J. Venus, for the Municipality of New Washington, Capiz Province.
14. Davao Light and Power Co., Inc. for the Municipality of Davao Province.
15. Ambrosio Andres for the Municipalities of Norzagaray and Angat. Balucan Province.

WATER SUPPLY

16. Dionisio Consengco, Manuel Santos, Donato Calimibas and Eusebio Cristobal, a franchise to install, operate and maintain a water supply system on the Municipality of Orion, Province of Bataan.

TELEPHONES—RADIO

17. Zamboanga Telephone Co., a 50 year franchise to install, operate and maintain a telephone system in the Municipality of Zamboanga.

18. The Philippine Legislature also passed an act authorizing the Secretary of Commerce and Communications to make a survey of the existing electric services with a view to placing same on a basis of adequate co-ordination and insuring greater efficiency in the Government telegraph service. In order that the Bureau of Posts may continue temporarily in charge of the administration, operaton, maintenance and repair of the radio stations and the radio and telegraph service in Manila, Cebu, Iloilo, Zamgoanga, Davao, Cagayan, (Misamis), Tacloban, Aparri, and Laoag, from January first to December thirty-first, nineteen hundred and thirty-one, the sum of two hundred and forty-five thousand nine hundred and forty pesos, was appropriated.

WHARF AND RIVER WALL

The sum of Pesos 137,000 as additional funds was appropriated for the construction and completion of a wharf and river wall, garage, and other auxiliary structures to the Post Office Building, Manila.

CULION ELECTRIC PLANT CONSTRUCTION

The Culion Ice, Fish and Electric Co., operating the plant in the leper colony of Culion will treble the capacity of its existing installation, changing from direct to alternating current. The Culion electric plant was first installed in 1918. At that time it was thought that direct current would be sufficient to take care of all electrical requirements in the colony. This plant is furnishing electric lighting cheaper than in any other place in the Islands. The company also furnishes fish to the lepers at lower prices than they are sold elsewhere. About six months ago the company completed a 15-ton refrigerating plant which insures a steady supply of fish for the people of the colony.

A German Contract

A report from Berlin dated November 25, states that Philipp Holzmann, A.G., the leading German works construction company, has received an order for the construction of an irrigation dam in China, which will cost £600,000. Nothing is known about this contract in China.

* * *

The General Electric Co., (India) Ltd. has removed its Madras Branch from 100, Armenian Street, Madras, to Magnet House, Mount Road, Madras.

New Railway Ministry Building, Tokyo

The frequency with which the Japanese Government Railway Office, housed in shacks, has suffered from fires—no less than four times—with an aggregate material damage estimated at Y.2,000,000, has prompted the expedition of the plan for a permanent structure.

As a result, the Government will begin construction work early in 1932 on a two-year program for a Y.5,500,000 fire and earthquake proof structure, occupying a total floor space of 10,000 tsubo behind Marquis Inoue's statue in front of the Tokyo station.

The Government originally intended to build a Y.10,000,000 structure, covering a total floor space of 18,000 tsubo, but in view of the steadily decreasing railway revenue, the Government decided to begin the construction work on a smaller scale for the present, with the probability of enlarging the structure when times get better.

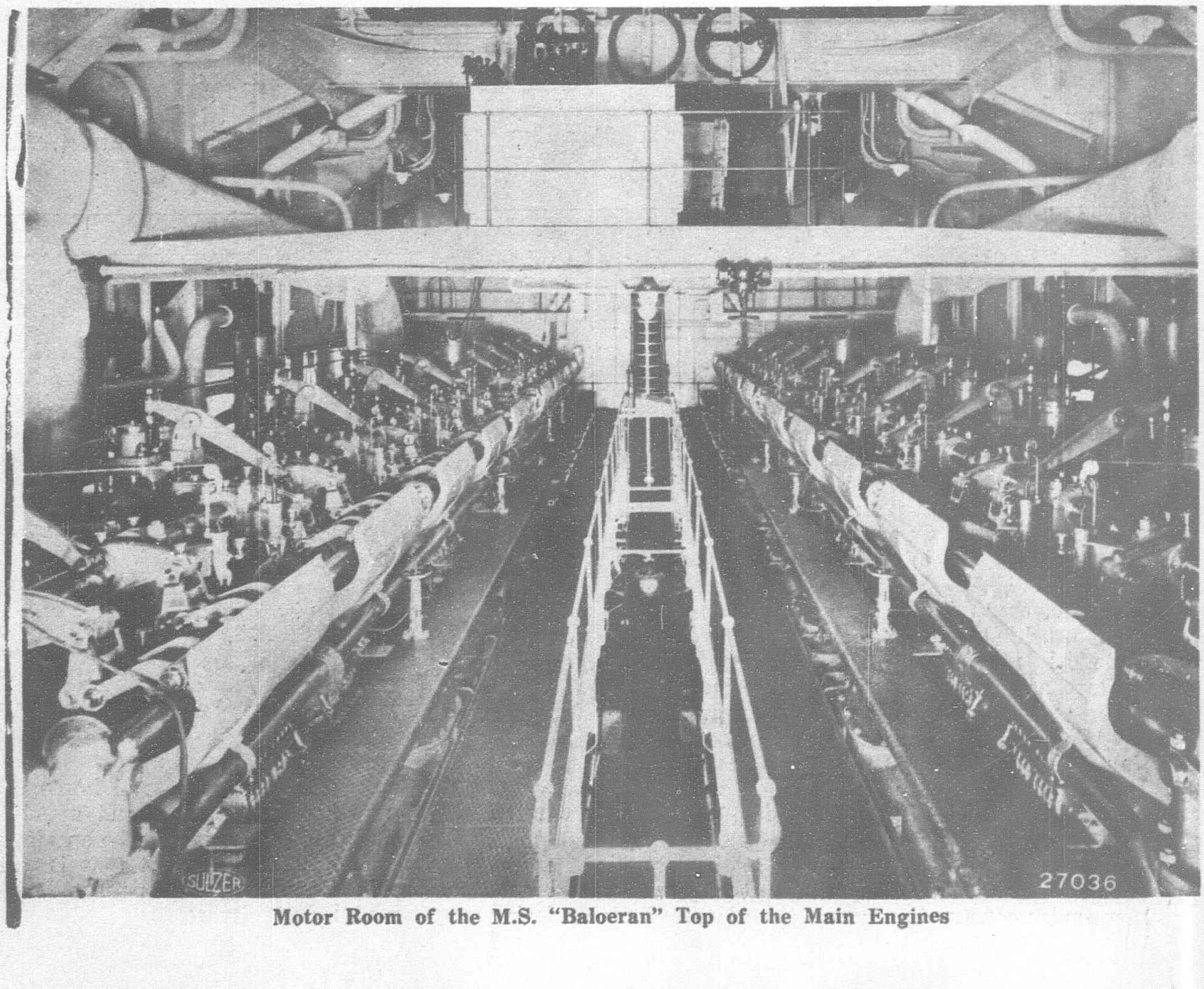
The new structure will be of eight stories, standing 100 feet high above the ground level and will face the Tokyo Central Post Office now under construction across the plaza. The side facing the boulevard will have a total frontage of 600 feet.

New Railway Ministry, Tokyo

In architectural design and appointment the new Railway Office building will, it is said, be an almost exact duplicate of the Marunouchi Building, except that it will be about half the size of the Marunouchi Building. The Railway Office building will be served by 20 elevators.

The Dutch Passenger Motorship "Baloeran"

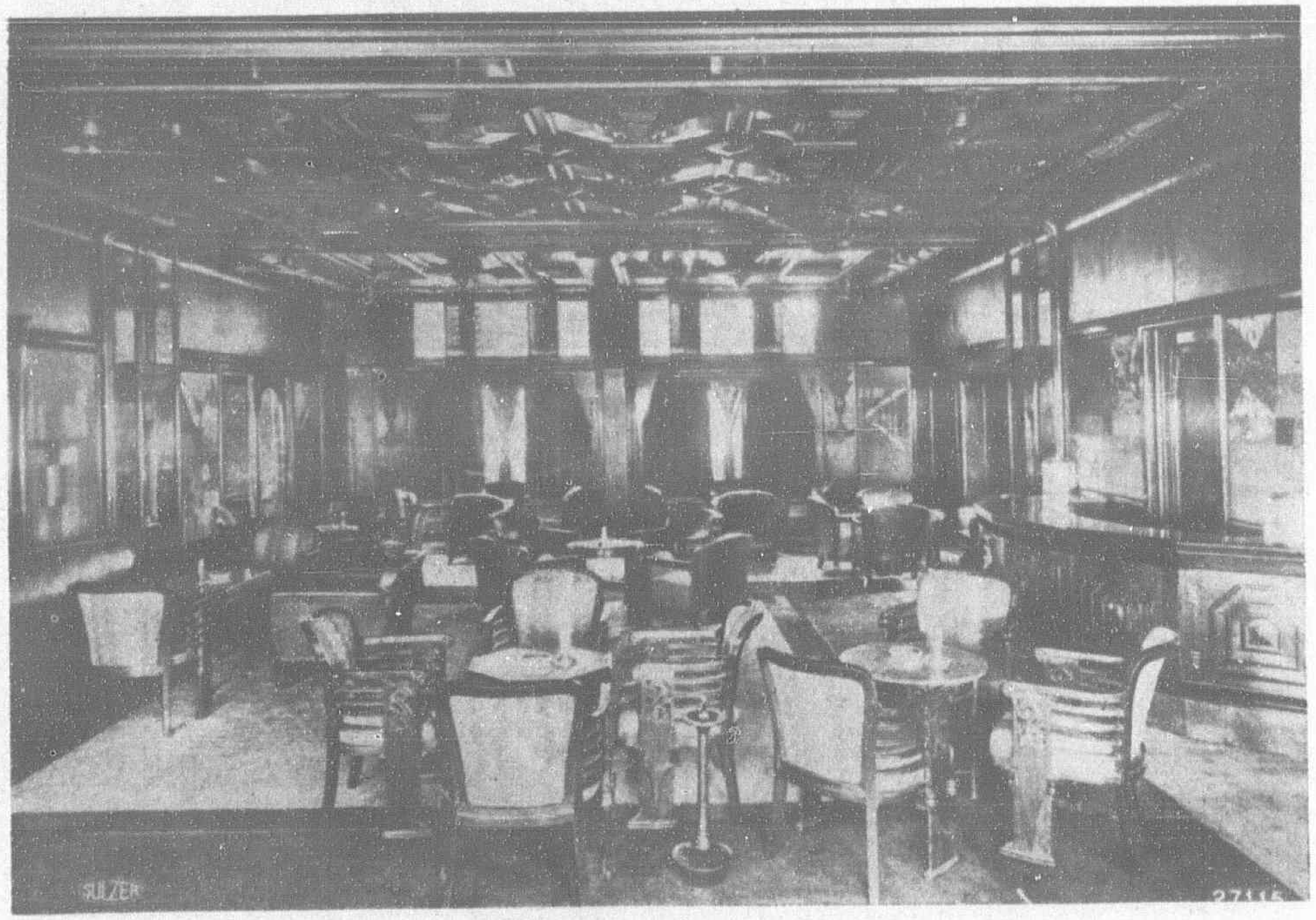
THE motorship *Baloeran*, which is named after the most easterly mountain on the island of Java, is a passenger ship for the East Indian service of the Rotterdam Lloyd, Rotterdam. In recent years there has been a remarkable development in the passenger service from Holland to the Dutch East Indies, only motorships having been built for this route since 1925. On this line as on others, it has been found that the Diesel engine drive can be utilized most efficiently when the service speed is increased. Whilst the former passenger ships made only about 15 knots on the route to the Dutch East Indies, the new motorship *Baloeran* and the sister ship *Dempo*, which is still under construction, are equipped with engines capable of giving them a continuous service speed of 18½ knots, thus increasing the speed by 3½ knots. Since, however, the round trip takes more than two months, two ships are not sufficient for fortnightly sailings. For this reason the shipowners have decided to install more powerful engines in some of their older ships, in order to increase their present speeds, and thus bringing them more into line with the speed of the *Baloeran* and *Dempo*, so that they can take their turn in a regular service.



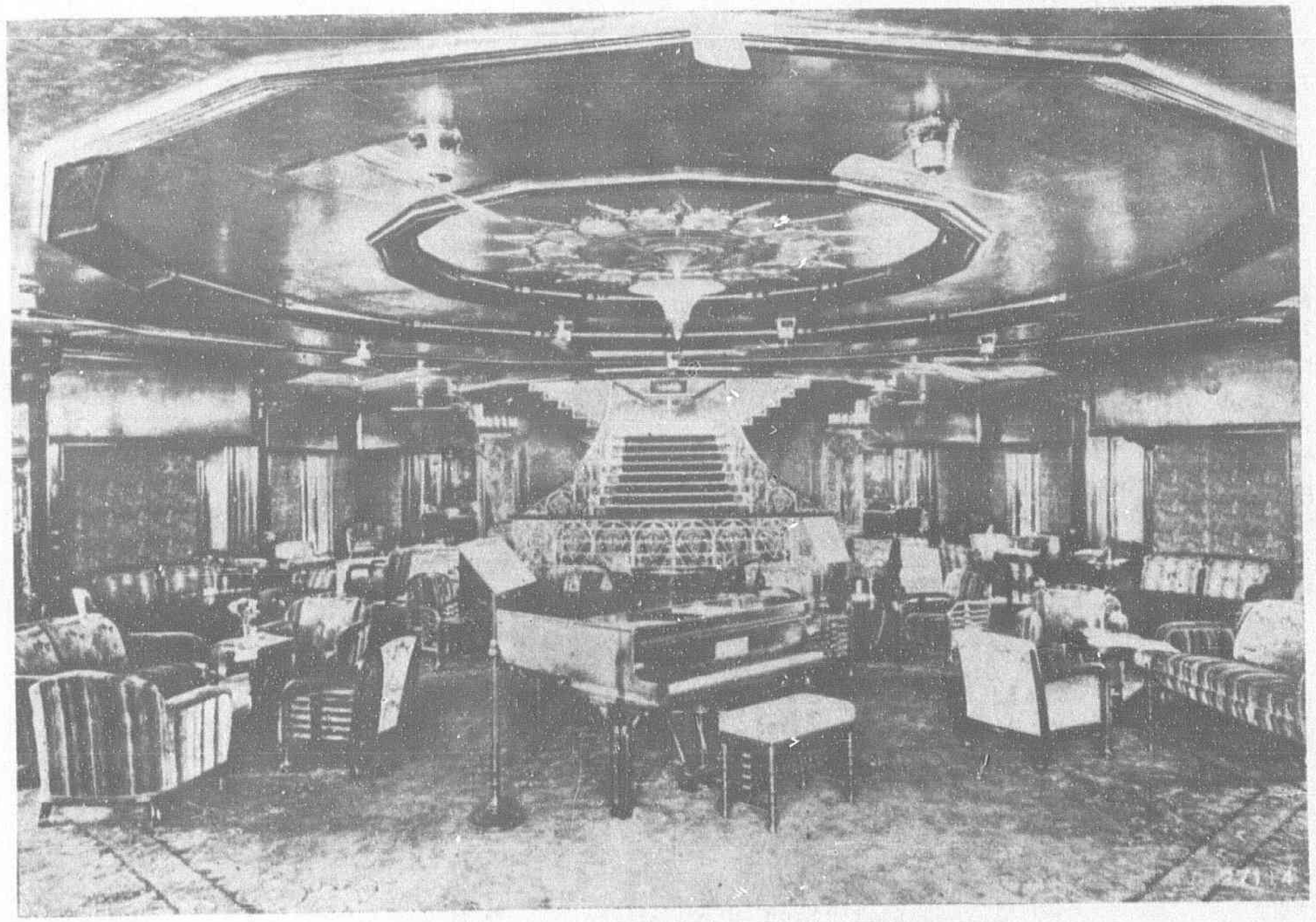
Motor Room of the M.S. "Baloeran" Top of the Main Engines

The motorship *Baloeran*, is characterized not only by the very ample deck space available for passengers, but above all by the special form of the superstructure. The bridge-deck, for example, does not extend to the side of the ship along the whole length of the deck-house, so that in this deck there is no side passage. Consequently the side wall of the deck-house rises uninterruptedly up

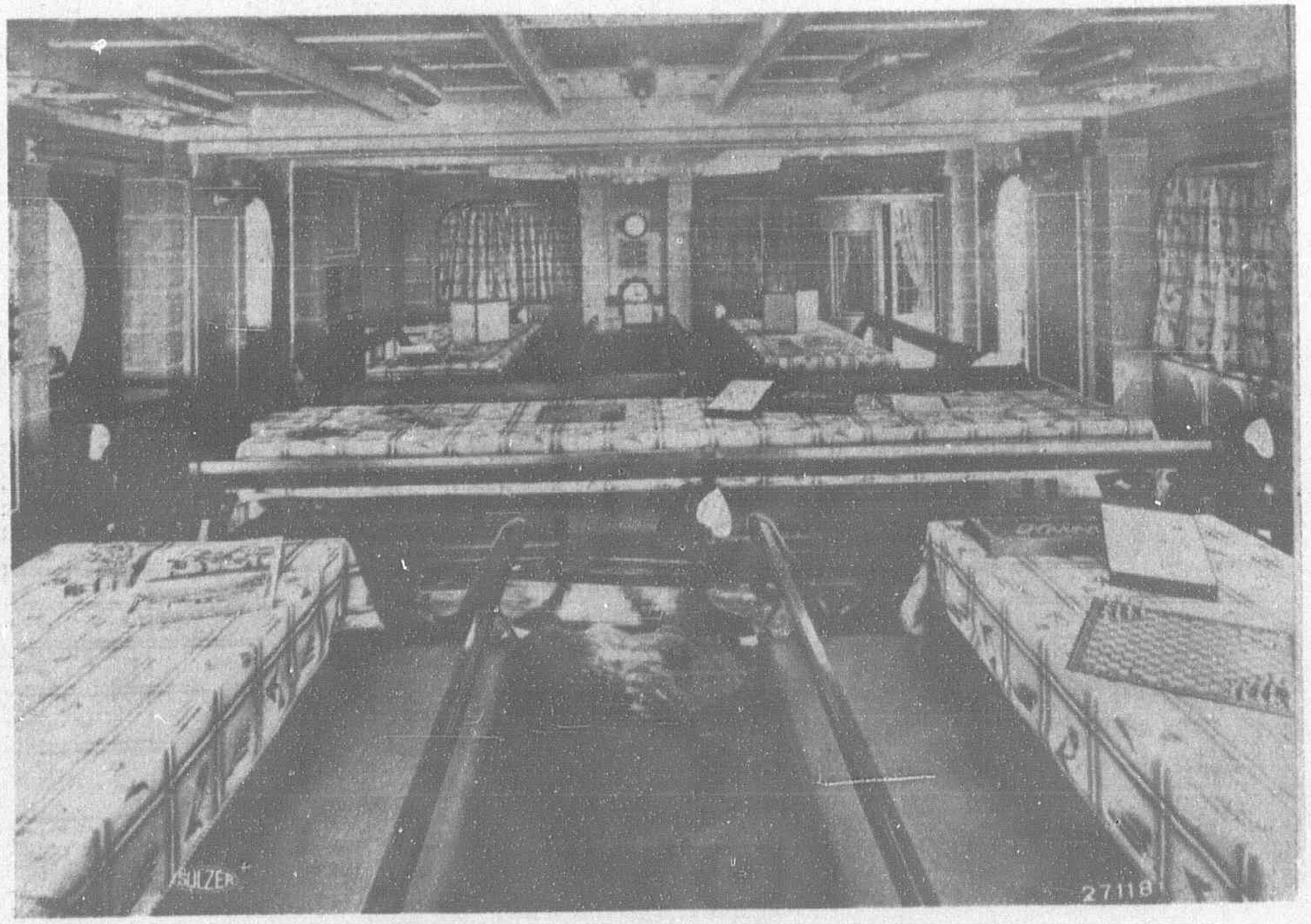
THE NEW ROTTERDAM LLOYD MOTOR LINER "BALOERAN"



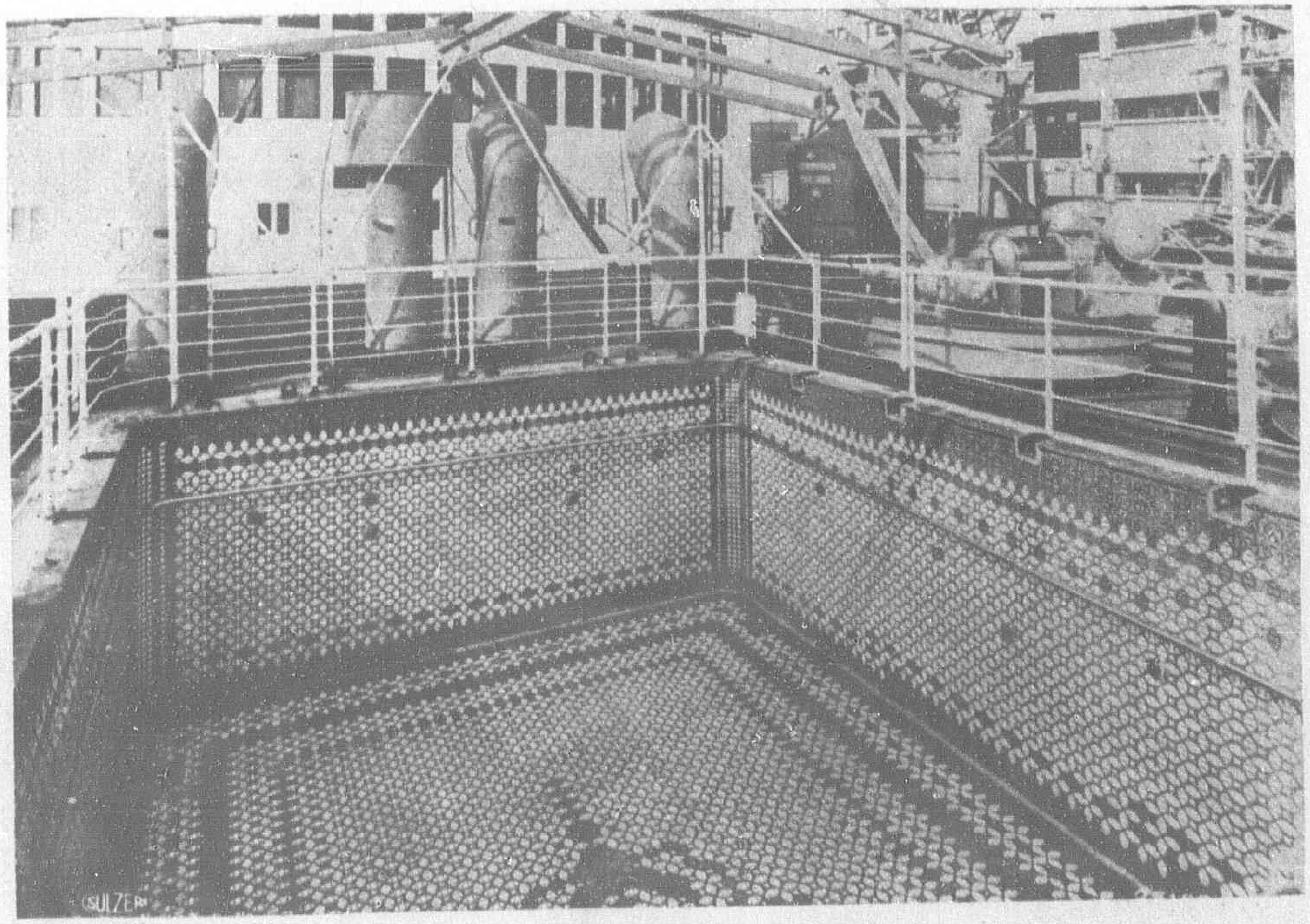
First Class Smoking Room on M.S. "Baloeran"



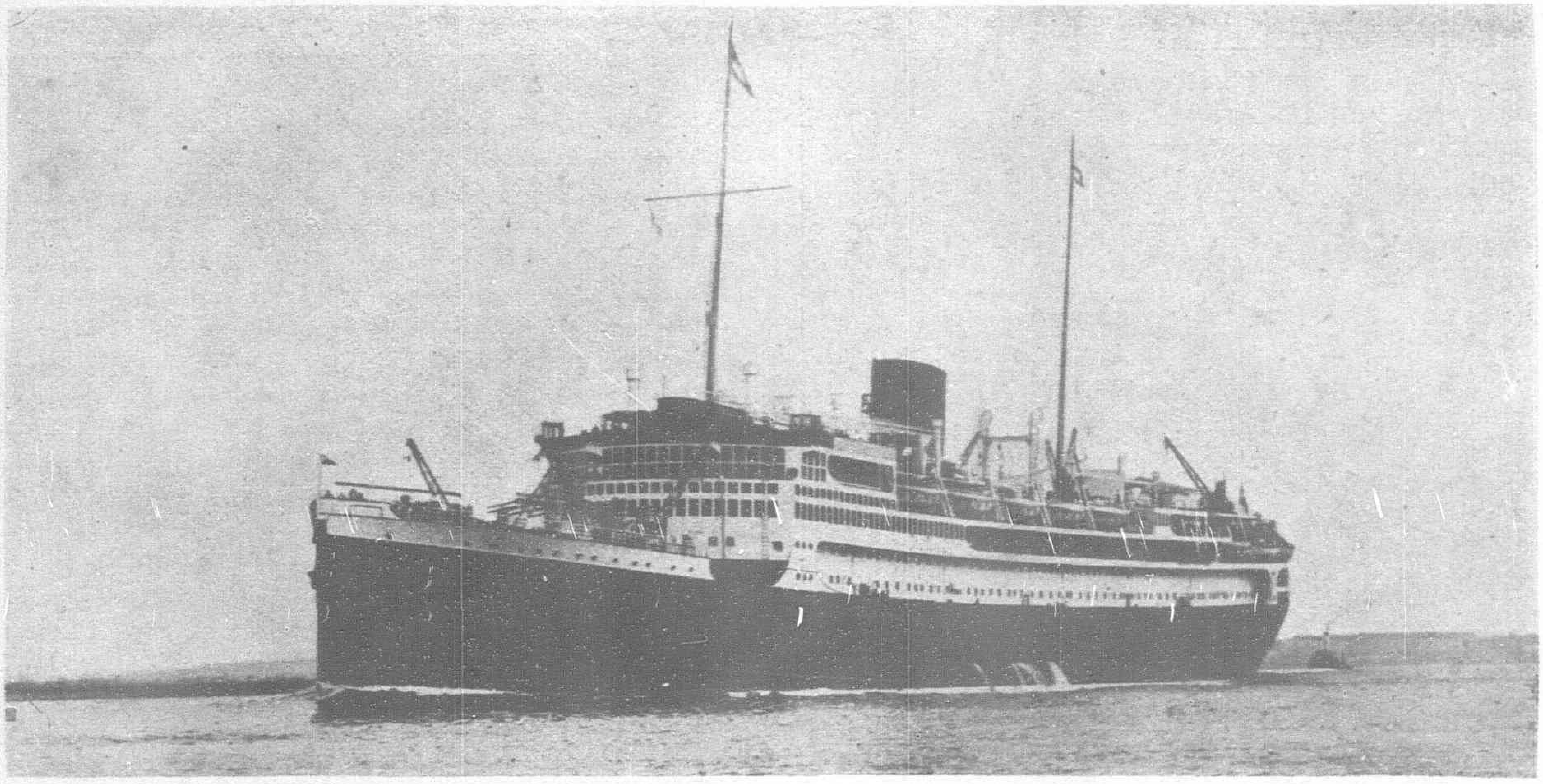
First Class Social Hall on M.S. "Baloeran"



First Class Day Nursery on M.S. "Baloeran"



Swimming Bath on M.S. "Baloeran"



Twin Screw Passenger Motorship "Baloeran" (18,000 B.-R.-T.) of the Netherland Steamship Co., Propelled by two Ten-cylinder Sulzer Diesel Engines, Developing a total of 14,000 B.H.P

two decks, thus giving the ship outwardly a special appearance. In addition to that, the masts could be arranged exactly as required from an aesthetic point of view, as the ship is equipped with deck cranes and the masts are not used as supports for the loading booms. The free choice of the location of the masts has allowed them to be put in the most favorable position, since the ship, in contrast to other of the same size and power, has only one funnel and the foremast, for the sake of appearance, is not placed so far forward as would be necessary if it had to serve to help in unloading the front hatch on a passenger ship of this type.

The principal dimensions of the ship are :

Length overall	574-ft.
Breadth	70-ft.
Height to D-deck	44-ft.
Draught	28-ft.
Cargo-carrying capacity	8,880-tons
Capacity of holds	381,000-cub.ft.
Gross tonnage	17,000-tons
Output of engines	14,000 b.h.p.
Speed of engines	102 r.p.m.
Service speed of ship	18.5 knots
Number of passengers : 1st class	236-254
2nd ,, ...	280-253
3rd ,, ...	70
4th ,, ...	48
Number of crew	330

The vessel was built in the "Feyenoord" shipyard at Rotterdam according to plans prepared by the Koninklijke Maatschappij "De Schelde," Flushing. The latter firm worked in collaboration with the manager and technical staff of the Rotterdam Lloyd and also supplied the Diesel engines. The *Baloeran* is a fulldeck vessel with long forecastle. Behind the front well is a deck-house two decks high, extending to the stern of the ship and having a side passage four feet wide on the main deck only. Under the main deck are three other decks and in No. 1 hold also a between deck.

CONSTRUCTION.—The main deck is the principal frame deck, so that the side walls of the deck houses and the decks erected above can be of lighter construction. In spite of that, no expansion joints are fitted in the superstructures and these, with regard to the longitudinal bending stresses and vibration in the direction of the length, form one part with the hull, so that the moment of inertia of the ship's cross-section is as large as possible. Because of the additional stresses thereby caused in the connections of the superstructure, the corners of the windows and door openings are carefully rounded off and the deck beams in the bridge and promenade deck are broken off at the side walls.

The design of the ship, distribution of accommodation, provision of life-saving means, etc. has been based on an endeavor to obtain the greatest possible safety. The vessel complies with the regulations drawn up by the International Congress for Safety at Sea in London in 1929, so that it is entered in the register of the Bureau Veritas with the ✠ safety sign.

The number of watertight compartments requires only seven bulkheads, so that the holds are amply long. Any two neighboring compartments may be flooded without any danger to the ship, since the buoyancy of the remaining compartments is then amply sufficient to maintain the ship above water. This complies with the regulations of Bureau Veritas for receiving the two circle classification sign. The main deck is the bulkhead deck. Under the upper 'tween deck the passages in the bulkheads are closed by watertight sliding doors, which can be operated from either side of the bulkhead and also from the upper deck. The watertight doors in the upper 'tween deck are of simpler construction; they are closed from either side of the bulkhead by means of bolts. Over the main deck there are three fireproof bulkheads, which reach up to the promenade deck.

The double bottom extends along the whole length of the ship and serves for carrying fresh water, fuel and waterballast. Purified fuel is stored in one of the double-bottom fuel tanks. In addition to the five fuel tanks in the double-bottom, there are seven oil bunkers and an overflow tank arranged forward of the engine room. One of the bunkers is designed as a Frahms rolling tank, in order to diminish the rolling of the ship in heavy sea. The owners of the vessel have already had good experience with a similar arrangement installed on the *m.s. Sibajak.*

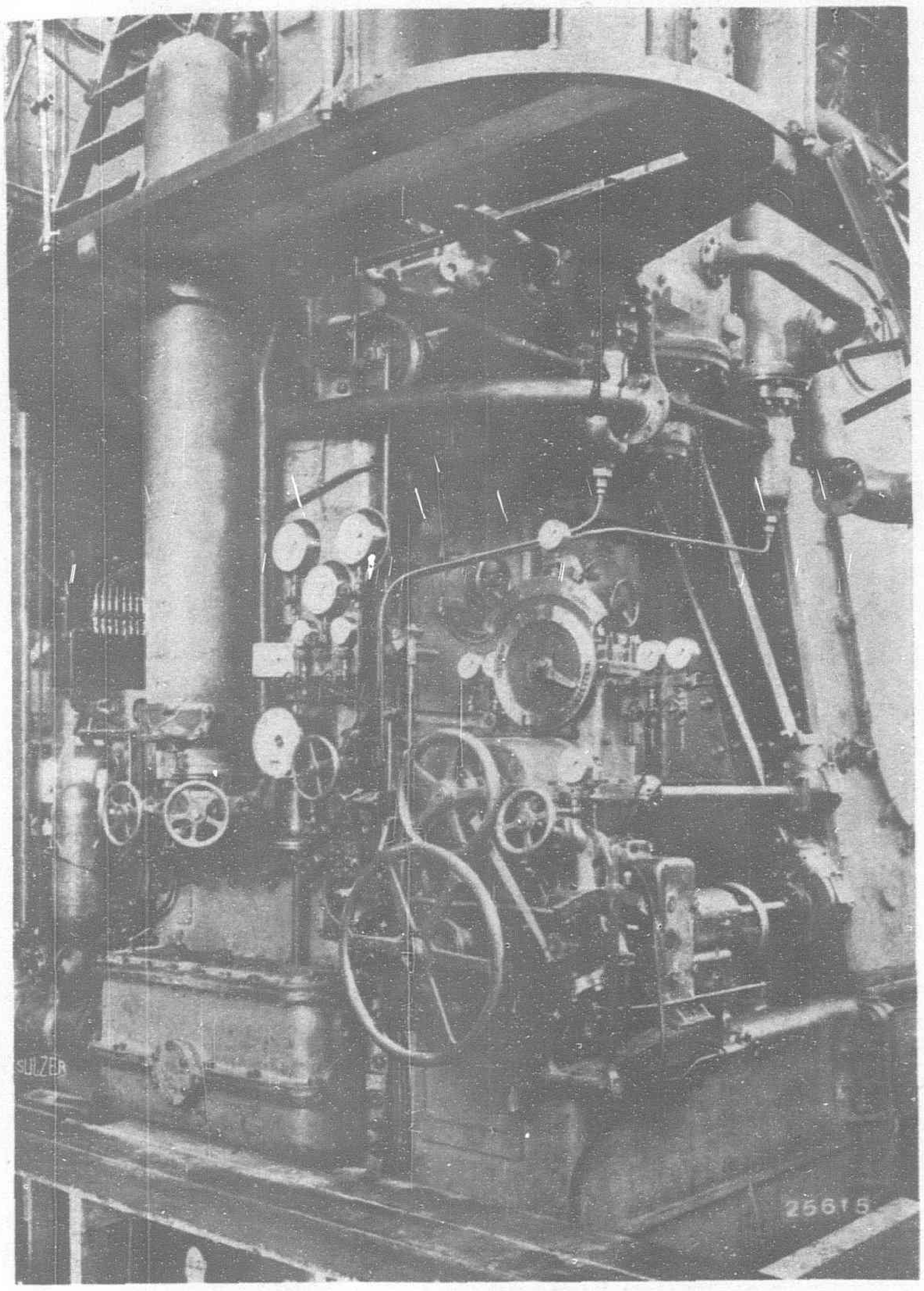
Lubricating oil tanks are fitted between the shaft-tunnels; over the tunnel space there are also four tanks for fresh water and in No. 3 hold two deep tanks for fresh water.

The double bottom is strengthened as usual under the main and auxiliary engines. The stiffenings are planed fit and all rivet holes are bored in place as far as possible.

In order to give the hull sufficient transverse strength along the length of the engine room, several web frames have been fitted on both sides. In addition to that, broad side stringers support the ordinary frames between the web frames. The stringers are at the height of the lower decks, which are partly broken through at the engine room.

In spite of its great breadth, the ship has only two rows of pillars widely spaced from each other, and both in the rooms and also in the superstructure. In consequence, nearly all the pillars in the saloons could be hidden behind the wall covering.

MACHINERY.—In contrast to other ships of similar power, which have separate engine rooms for the main and auxiliary engines, there is on the *Baloeran* only one engine room, where all the auxiliary machinery is located beside the main engines. The vessel is consequently distinguished by its space occupied by its machinery plant being very short. In spite of the great power of the machinery which had to be located here, the space available for the cargo holds is in no way affected. The choice of twin-screw

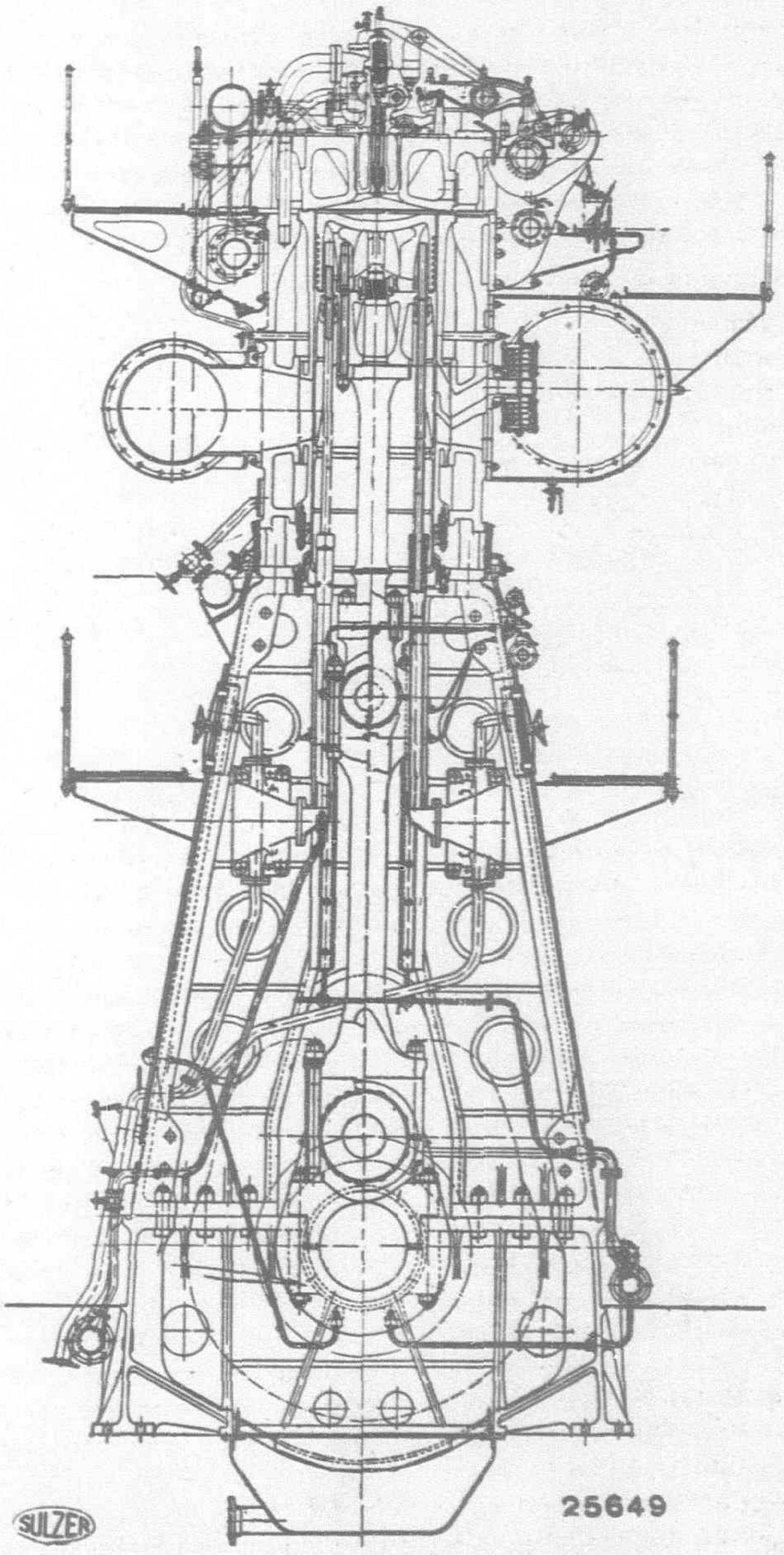


Control of one of the 7,000 B.H.P. Diesel Engines for M.S. "Baloeran"

propulsion also helps towards this, since the holds aft are less cut up than they would be in a quadruple-screw ship; the twin-screw drive is also suitable for ships which carry much cargo as well as passengers. The plant also requires little height, a particularly desirable feature in a passenger ship. In consequence of the low height of the main engines, the engine room only passes through the two lower passenger decks and with a comparatively small breadth midships, so that there is still sufficient room on both sides of the trunk to allow the passenger accommodation to be continued without interruption. In contrast to steamers, it is striking how little the decks are broken by the machinery. In the upper decks the engine room trunk takes up only a few square yards, so that in the *m.s. Baloeran* the advantages of motor drive for passenger ships are clearly evident.

Each of the two Sulzer single-acting two-cycle main engines has 10-cylinders of 670 mm bore and 1,340 mm stroke. When running at 100 revs. per min. the two engines together develop normally 14,000 b.h.p. There are several noteworthy features in their construction. The ten-cylinder arrangement has hitherto been little used for marine engines. Particularly in the two-cycle type of engine it allows of a small flywheel being used because of the very slight degree of irregularity, and ensures, together with the well known Sulzer rigid system of construction, absolutely smooth running. The very simple outward appearance of the engines is due in the first place to the Sulzer port scavenging, which requires the smallest possible number of moving parts, such as valves, etc. This feature, as well as the perfect scavenging of the cylinder, ensures great reliability of working. Because of the great length of the engine, the vertical governor shaft is situated in the middle of the engine between cylinders 5 and 6, in order to ensure that the valves of all cylinders are operated uniformly. The vertical shaft is driven from the crankshaft by bevel wheels. The valve gear itself is of the usual type, but a second servo motor for driving the reversing wheel is fitted, in addition to the servo motor for starting. The servo motors are worked by compressed air, and their regulating valves are operated by means of starting and reversing levers on the service platform. The mechanism is fitted with a blocking device, so that it is impossible to move both levers simultaneously. For instance, when reversing, the starting lever must first of all be turned back into the stop position, and only then can the reversing lever be operated. The fine adjustment of the lift of the fuel needles can be made by hand at the reversing wheel; for regulating the fuel delivery, a special lever with fine adjustment is provided. The mechanical operating of the gear when manoeuvring makes it possible for each of the main engines to be attended by only one machinist. For the same reason the fuel pumps are arranged immediately beside the service platform and driven from the crankshaft of the compressor.

The separate cooling for the cylinders is worthy of mention. The cooling water for the cylinders is led through a pipe along the engines, and from this pipe there is a branch to the top and to the bottom of the jacket of each cylinder. The water flowing to the lower part of the cylinder is regulated by means of a valve. This is of great value when sailing in the tropics, since larger quantities of cooling water can then be led to the upper part of the cylinder jacket by throttling the flow to the lower part, according to the temperature. The cover with the fuel valves and the cylinder jackets of the main engines have sea-water cooling, whilst the pistons are cooled with fresh water. Each main engine drives



Section Through Working Cylinder of one of the 7,000 B.H.P. Diesel Engines for M.S. "Baloeran"

an injection air compressor, its fuel pumps, its lubricating oil pumps, a bilge pump and a fresh-water pump. The pumps are at the forward end of the engine. The arrangement of two compressor cylinders on each main engine is solely in order to ensure absolutely smooth running and freedom from vibration, the forces and moments from the compressors being completely balanced by setting their cranks at 180° to each other. Both compressors have three stages, but only the first stage is double acting. They are fitted with lanterns, just like the Diesel cylinders, so that by shutting off the crank space the cylinder lubricating oil cannot reach the crank case.

For handling heavy parts when the main engines are being overhauled, two overhead cranes are provided, fitted close to the engine room ceiling. Each crane is provided with a 5-ton electrically-driven crab.

In order to utilize the output of the main engines as far as possible for the propulsion of the ship, electrically driven scavenging air pumps have been installed, two turbo blowers being provided for supplying the scavenging air for the main engines. One blower is sufficient even when both engines are working with overload, so that the second serves as stand-by. The blowers are located in a sound-proof chamber at the forward end of the engine room, but, for the sake of accessibility, the motors driving them are located outside the chamber. The air is drawn from the engine room. A common air duct connects the delivery branches of the blowers to the scavenging air receiver of the main engines. A throttle valve is fitted in each branch pipe to the delivery branches and the receiver. The maximum output of the blowers is over 63,500 cub. ft. per min. at 1,800—2,400 revs. per min. The maximum output required from the electric motors is 515 kw.

AUXILIARY MACHINERY.—The auxiliary machines, with the exception of the pumps on the main engines, are electrically driven. The current required for this purpose is supplied by four Diesel-generator sets installed on both sides of the ship alongside the main engines. Each set consists of a Sulzer two-cycle engine developing7 80 b.h.p. at 180 revs. per min., direct coupled to a D.C. compound dynamo for 510 kw., 220 volts. Each Diesel engine has six cylinders of 380 mm bore and 660 mm stroke and is equipped with a double-acting scavenging air pump and a three-stage compressor. The pump and compressor have their cranks set at 180° to each other, thus ensuring good balance and smooth running. The output of the compressors is very ample, so that they can, if necessary, be used for supplying the starting air for the main engines. The auxiliary engines drive their own fuel and lubricating oil pumps. The pistons are cooled with air and the cylinders with sea water. When manoeuvring, the injection air is supplied by two manoeuvring compressors. Each of these compressors has a capacity of 19,500 cub. ft. per min. and is electrically driven by a 150-h.p. motor. An emergency compressor set, a single-cylinder Sulzer hot-bulb engine developing 6-h.p. at 450 revs. per min., with two-stage compressor cylinder, supplies the starting air required for starting the large auxiliary engines the first time. In the engine room there are 13 injection air bottles, each of 1,200 litres capacity for storing air at 70 atm. (1,000 lb./sq. in.) pressure and two starting-air containers, each of 810 cub. ft. capacity for air at a pressure of 25 atm. (360 lb./sq. in.).

PASSENGER ACCOMMODATION.—The passenger accommodation has been arranged in such a way as to ensure comfort and coolness on board when passing through the tropics. The saloons have large windows and doors, all of which can be opened. Also in the wind screens, large sliding windows are fitted. The cabins in the superstructure are provided with double-sashed windows, and the first and second class rooms on the main deck receive plenty of air and light, because of the omission of the through passage in the bridge-deck. Ample deck space, a total of more than 3,600 sq. yards, is provided for all classes, so that the passengers can remain freely outside. Behind the bridge is the sports deck for the first class, and further behind over the boat deck is a promenade deck reserved for the personnel of the ship.

The various public rooms are fitted out in modern style. The first class dining saloon is particularly noteworthy, as it has an uptake in the middle extending through three decks and is closed round in each deck by an artistic iron railing. The dining saloon has an area of 3,800 sq. ft. and a height of 8½-ft. at the sides. The fittings are of polished mahogany and ebony. In the evening it is lighted indirectly. There is place for 234 passengers at small tables. The main staircase which leads to the boat deck leads directly into the dining room. Behind the staircase there are two lifts. Forward, the first class hall is rounded and, like the neighboring first class smoking room, is 10½ ft. high. It is fitted with upholstered furniture and small low tables; the woodwork is of polished teak with ebony ornamentation and the walls are partly covered with cloth. For lighting, there are two alabaster fittings at both sides of the staircase carried by bronze statues. The rest of the lighting is indirect. Oak is used for the smoking room; the panels under the brown leather frieze are hung with tapestry. Comfortable easy-chairs, sofas and arm-chairs with small tables are provided. In the children's room the walls are painted with scenes from well known fairy tales.

The second class dining room has a floor area of about 3,900 sq. ft. and has unpolished mahogany panelling. There is place for 260 persons at small tables. The smoking room, fitted in oak with walnut panelling, has upholstered arm-chairs and sofas. There are also various writing tables. A lightcolored mahogany with panels of special wood is used for the second class hall. Along the middle of the back wall there is a serving table which is used as an altar at church services.

For the first class there are 252 beds, including 60 children's beds. This number can, if necessary, be increased to 300 by taking in some second class cabins on the bridge-deck, so that there is a total of 81 single cabins, 85 two berth cabins and two state cabins for the first class. All cabins have wide double windows. There are also 15 bath-rooms arranged in such a way that each of them can be reserved for one cabin. The other bath-rooms are in the middle of the ship.

At both sides forward on the bridge-deck there is a state cabin, which can be divided into bed and sitting room by a curtain; each of the state cabins has its own bath-room. Both cabins are provided with ordinary beds. Each cabin is decorated in a special style. The other first class cabins are white enamelled, with furniture and woodwork in polished mahogany. In the single cabins the beds can be folded up, so that the whole floor space of the cabin is free during the day. In these cabins, in addition to the washstand and the wardrobe there is a writing table with an arm chair, whilst the two-berth cabins are fitted, instead of this, with a dressing table and a sofa. 46 sofas can be used as children's beds. The second class cabins comprise 88 two-berth cabins, 25 three-berth and seven four-berth. Of these, a total of 80 are deck cabins. The third class has only cabins for three to four persons, whilst the fourth class passengers are accommodated partly in cabins for four to six persons and partly in a dormitory fitted with beds which can be removed if not required. All the passenger cabins of the first, second and third class are fitted with running water and have folding wash-hand basins. The basins in the lavatory have taps for hot and cold water. In all there are 82 bath-rooms. All baths are built in and connected to the hot and cold water piping. Each bath has a douche, and in addition to that there are special shower baths with cold water only. The vessel has an open swimming bath, 26-ft. by about 20-ft broad on the forecastle deck which can be reached by a gangway from the first class cabins on the bridge-deck.

Throughout the ships, except in the state cabins which have central heating, the heating is electric. In the saloons there are tube-shaped radiators, whilst the passenger cabins are heated by electric stoves which can be regulated. The rooms for the personnel are also heated in the same manner. All the heating apparatus work with low temperature. There are about 525 heating apparatus requiring a total of 375 kw.

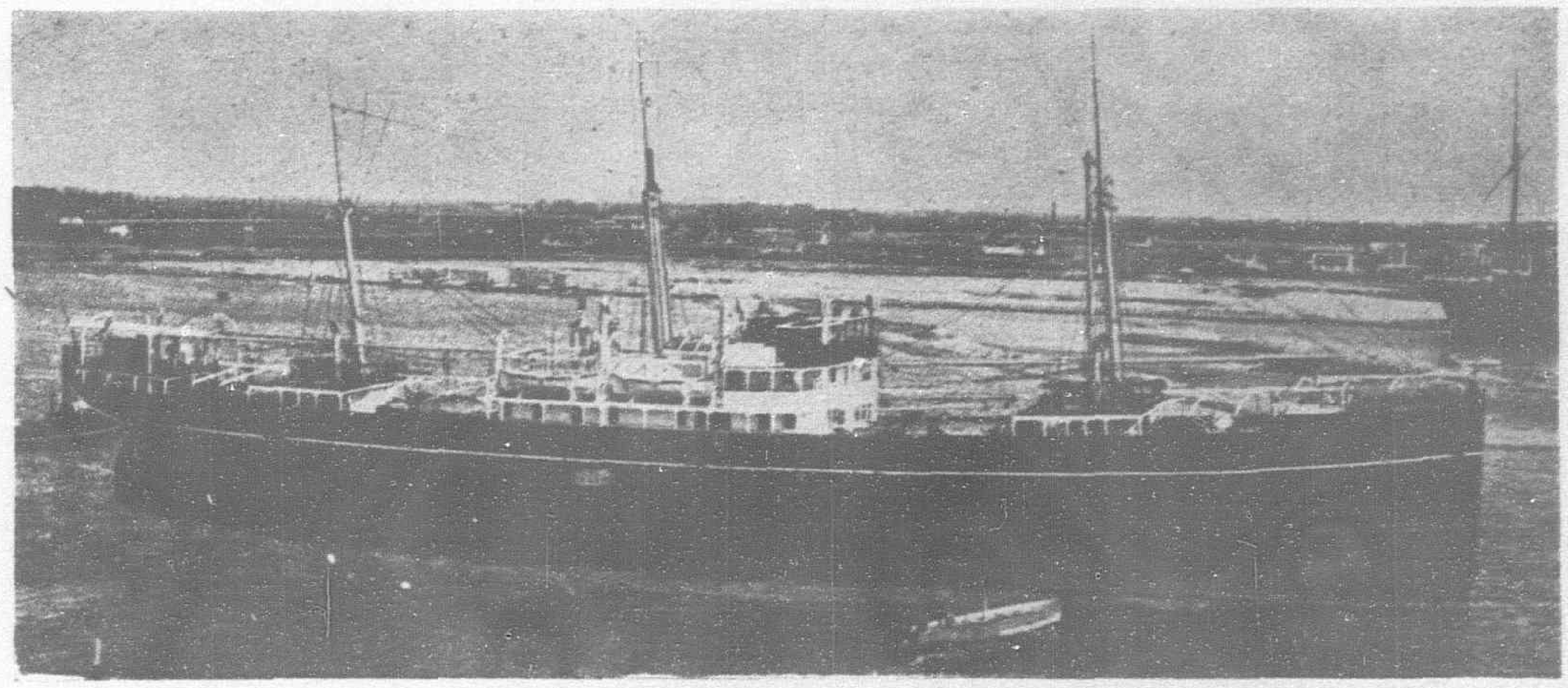
Each cabin is fitted with a fan for ventilating purposes. Otherwise the cabins have only natural ventilation, since there are no inner cabins in the whole ship. Artificial ventilation is used for the first and second class dining saloons, the kitchens, the rooms for the Javanese servants, the rooms and cabins in the stern under the 'tween deck and for the bath-rooms and lavatories inside the ship. For these departments there is a total of 11 groups of fans. The two dining saloons have both suction and plenum ventilation, the air issuing from the first class dining saloon through 38 grids each with four duplex orifices. The grids regulate the air current both as regards supply and direction.

For fighting fire in the holds or in the engine room, a large carbon dioxide station has been installed in a separate room in hold No. 11. This station consists of a number of carbon dioxide bottles, the gas from which can be led through piping to the various

(Continued on page 130).

An Enterprising Firm of Danish Shipbuilders

The Nakskov Shipyard



M.S. "Bintang," Built by the Nakskov Shipyard for The East Asiatic Co., Ltd.

ONE of the most important builders of up-to-date vessels designed for the Far Eastern trade is the Nakskov Skibsvaerft whose shipyard is situated at the port of Nakskov, Denmark, which lies at the entrance to the Baltic and just opposite the entrance to the North Sea Canal.

It may be mentioned as a matter of historical interest that in 1630 the Danish King Christian IV founded a shipyard at the port of Nakskov, and having engaged a Scotch shipbuilder by the name of Daniel Sinclair, constructed a great number of ships for the Danish Navy. Many ships have since that time left the slipway at Nakskov.

In 1916 the Nakskov Skibsvaerft was established for the construction of modern vessels and the yard was built during the next two years. In 1919 the first ship, the Diesel tanker *Mexico* was launched and since then many ships of every size and description have been floated. In addition to the construction of new vessels a large number of boats have been repaired by the company.

Within the last few years the Nakskov Skibsvaerft has built to the order of Messrs. The East Asiatic Company, Ltd., three large passenger motorships for their regular trade between Bangkok and Europe. These ships have proved very successful and on account of the high standard of accommodation provided for by the owners they are very popular with the travelling public on the eastern routes.

As can be judged by the following particulars, these vessels keep up a good average speed at sea and it is to the credit of the builders that passengers embarking at Singapore are landed in Europe at the same time as those of the mail steamers. According to the engineer's log these three steamers maintain the following average speed.

	I.H.P.	*Speed*	*Revolutions*
Lalandia	5,200	14.5 Knots	130
Meonia	5,200	14.5 ,,	130
Alsia	6,700	15 ,,	138

The Nakskov Skibsvaerft has also completed a fourth vessel for the East Asiatic Company. This new ship is larger in size than the others, being 450 feet long and with accommodation for about 150 passengers. The speed of this new vessel will be 17 knots.

The company has also built a number of cargo motorships ranging from 6,000 to 14,000 tons deadweight. The company is planning the construction to the order of the East Asiatic Company a new cargo vessel of 14,000 tons of a length of 488 feet. This ship, the bottom of which has already been laid down will have a B. & W. type engine of 7,100 i.h.p. capable of a speed of 13½ knots at 145 revolutions.

In addition to the construction of motor passenger and cargo vessels the company has also built a number of cargo steamers for the Baltic and Mediterranean trade in sizes ranging from 2,000 to 4,000 tons deadweight. Furthermore, the Nakskov Skibsvaerft has also built several special types of ships for the Siam Steam Navigation Co's. coasting trade in the East. These ships are specially designed for trading in the tropics.

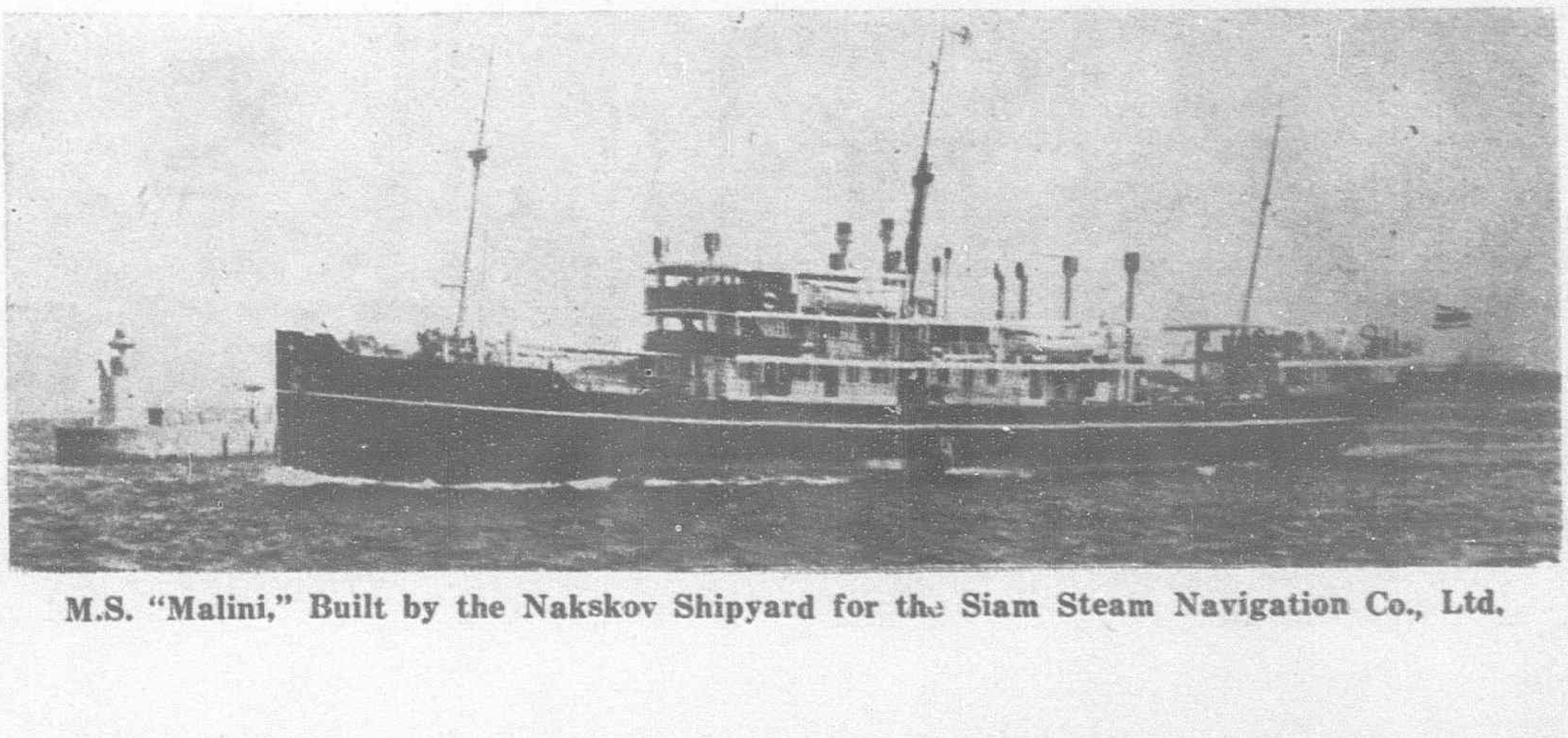
The capacity, tonnage, etc., of the vessels built to the order of the Siam Steam Navigation Co., of Bangkok, are set out in the following schedule :—

Name	*Principal Dimensions*	*Capacity*	*Tonnage*	*Engine*	*Speed loaded ship*
Bintang	Length 299′-10½″	D. W. 3,400 Ts.	*2,779	Type B.& W. Diesel	
	Breadth 44′-0″	Cubic 207,200	†1,725	Number 2	11
	Depth 28′-0″	Fuel oil 406 Ts.	—	I.H.P. 1,400	
	Draft 19′-3″	Pass. 12 I Cl.		Rev. 130	
		650 Coolies	—		
Virginia	Length 177′-10¾″	W. D. 970 Ts.	*641	Type Holeby Diesel	
	Breadth 31′-0″	Cubic 43,800	†364	Number 1	10
	Depth 14′-3″	Fuel oil 48.2 Ts.	—	I.H.P. 480	
	Draft 13′-3⅛″	—	—	Rev. 190	
Nibha	Length 191′-2″	D. W. 286 Ts.	*513	Type Triple Exp.	
	Breadth 30′-0″	Cubic 23,700	†276	Number 2	12
	Depth 17′-6″	Fuel oil 66.1 Ts.	—	I.H.P. 400	
	Draft 8′-0½″	Pass. 18 I Cl.		Rev. 130	
		200 Coolies	—		
Malini	Length 235′-6″	D. W. 1,055 Ts.	*1,278	Type Holeby Diesel	
	Breadth 35′-6″	Cubic 83,130	†788	Number 2	12
	Depth 20′-0″	Fuel oil 111.6 Ts.	—	I.H.P. 1,100	
	Draft 12′-11¼″	Pass 21 I Cl.		Rev. 200	
		400 Coolies	—		
Bhanu-rangsi	Length 216′-0″	D. W. 530 Ts.	*686	Type B.& W. Diesel	
	Breadth 32′-6″	Cubic 39,230	†410	Number 2	12
	Depth 19′-0″	Fuel oil 71 Ts.	—	I.H.P. 900	
	Draft 9′ 9-3/16″	Pass. 20 I Cl.		Rev. 190	
		200 Coolies	—		
New-building	Length 345′-0″	D. W. 3,200 Ts.	*3,020	Type B. & W. Diesel	
	Breadth 48′-9″	Cubic 226,000	†1,880	Number 2	14
	Depth 29′-0″	Fuel oil 650 Ts.	—	I.H.P. 3,000	
	Draft 17′-3″	Pass. 34 I Cl.		Rev. 175	
		1,300 Coolies	—		

* Gross. † Net.

The *m.s. Bintang*, which was put into commission in 1921 for the coolie and passenger trade between Singapore and Hongkong is to be followed by another ship which will embody all the latest improvements based upon the previous experiment.

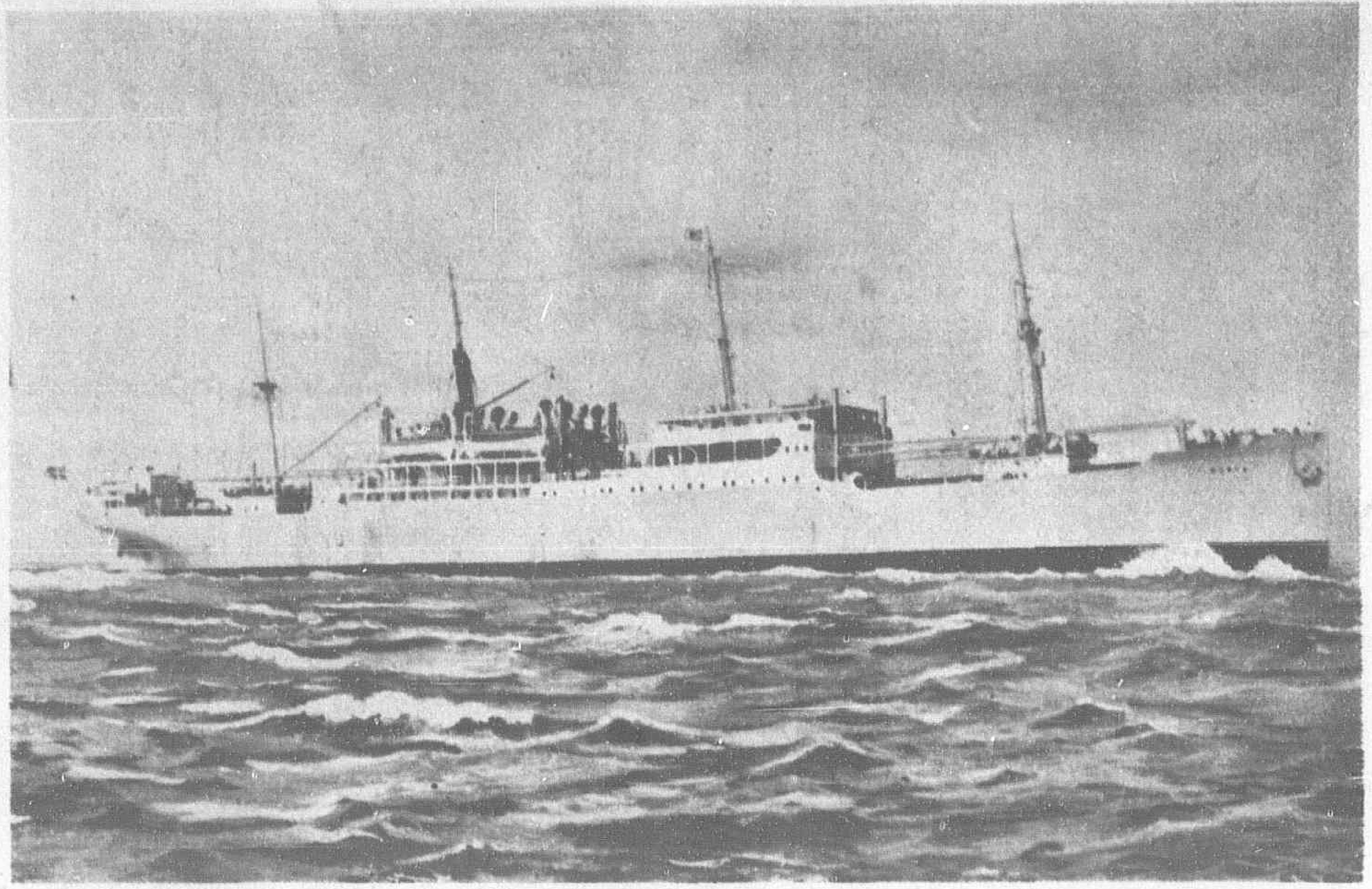
Ships for special services, such as cable steamers, railway and motor-car ferries have also had the attention of this enterprising shipbuilding concern.



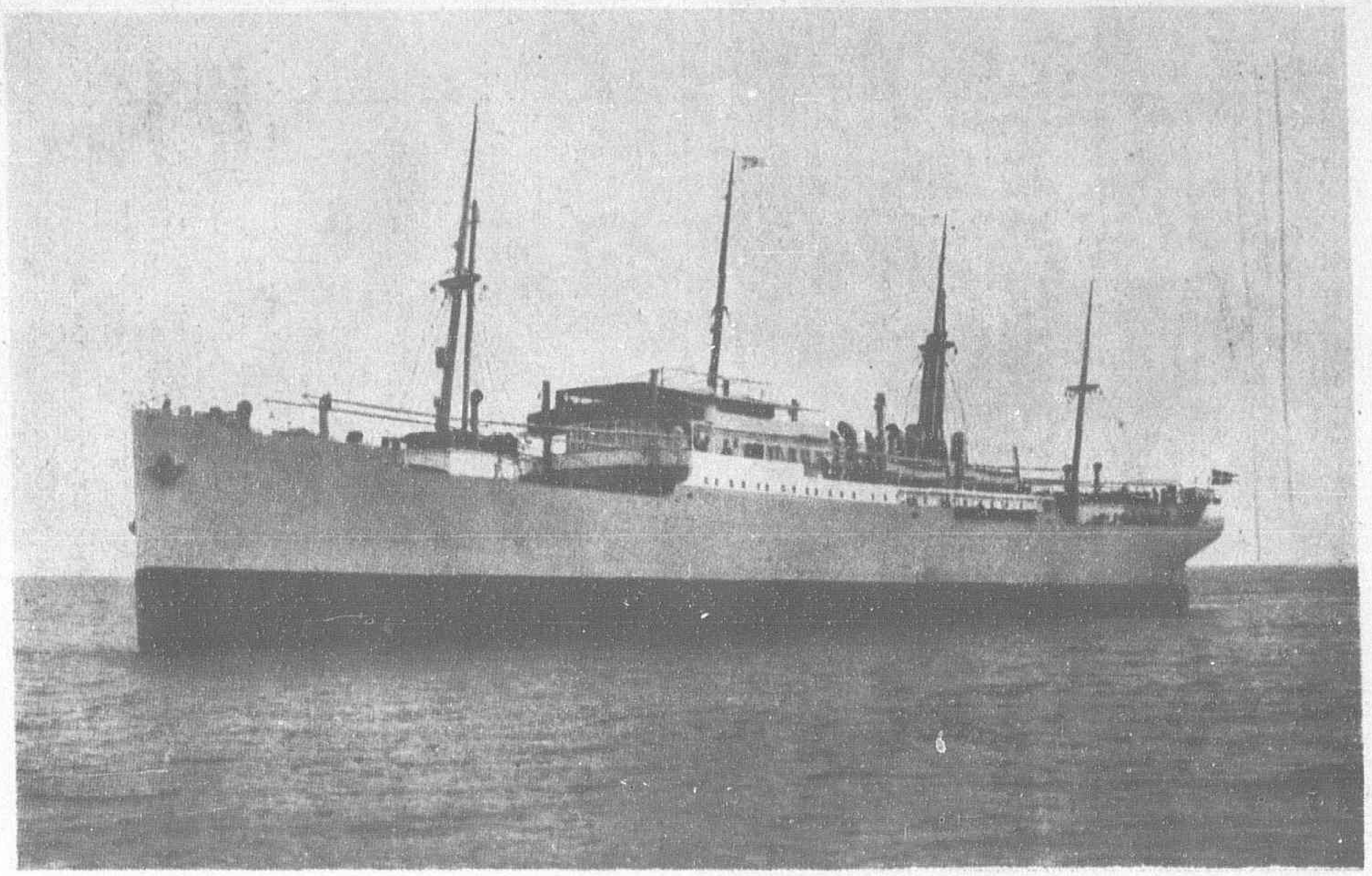
M.S. "Malini," Built by the Nakskov Shipyard for the Siam Steam Navigation Co., Ltd.

MOTOR VESSELS OF THE EAST ASIATIC COMPANY'S FLEET

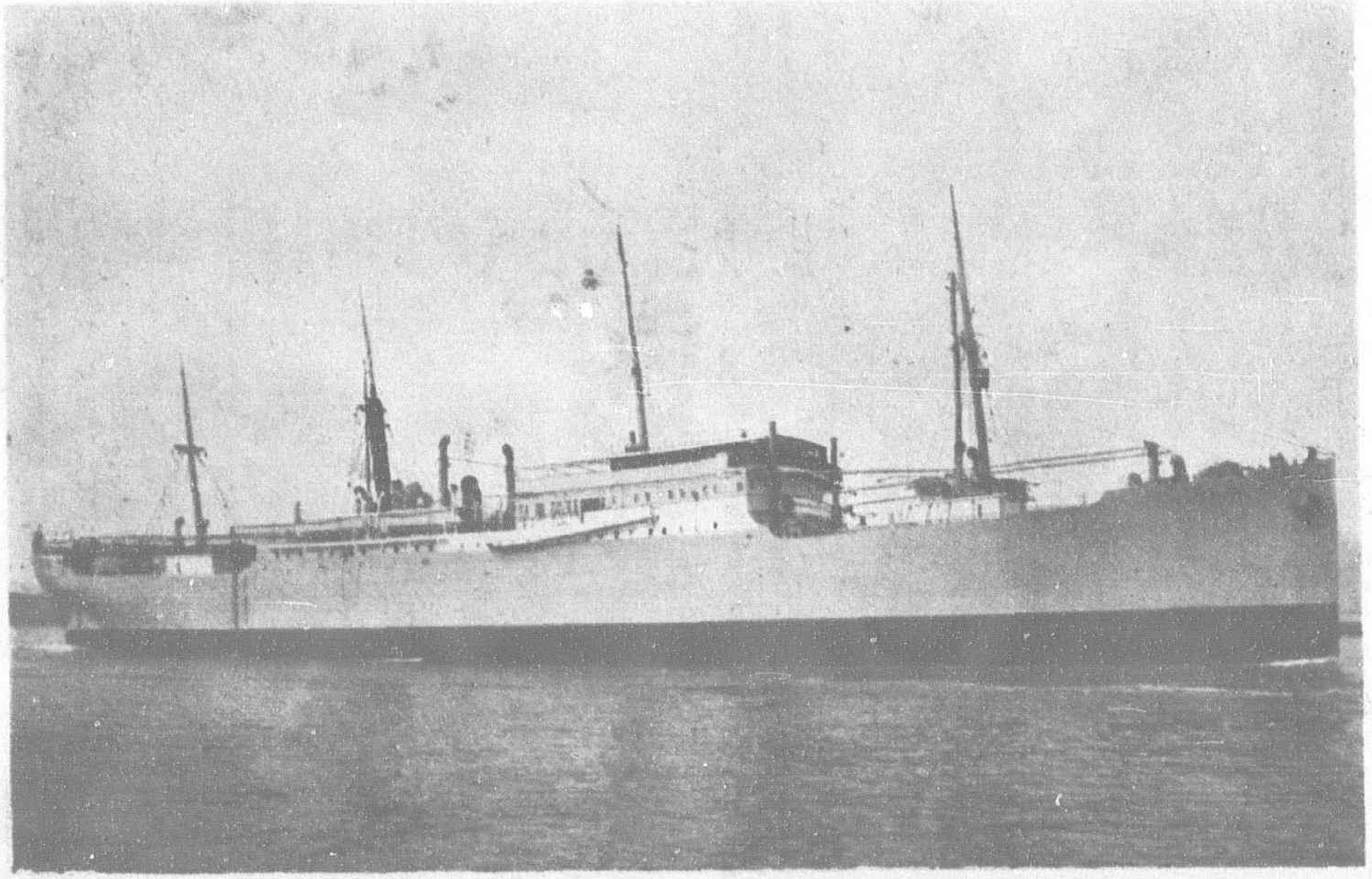
Built by the Nakskov Skibsvaerft, of Nakskov, Denmark; All Motor Vessels Built by the Nakskov Shipyard are Equipped with Burmeister & Wain Diesel Engines



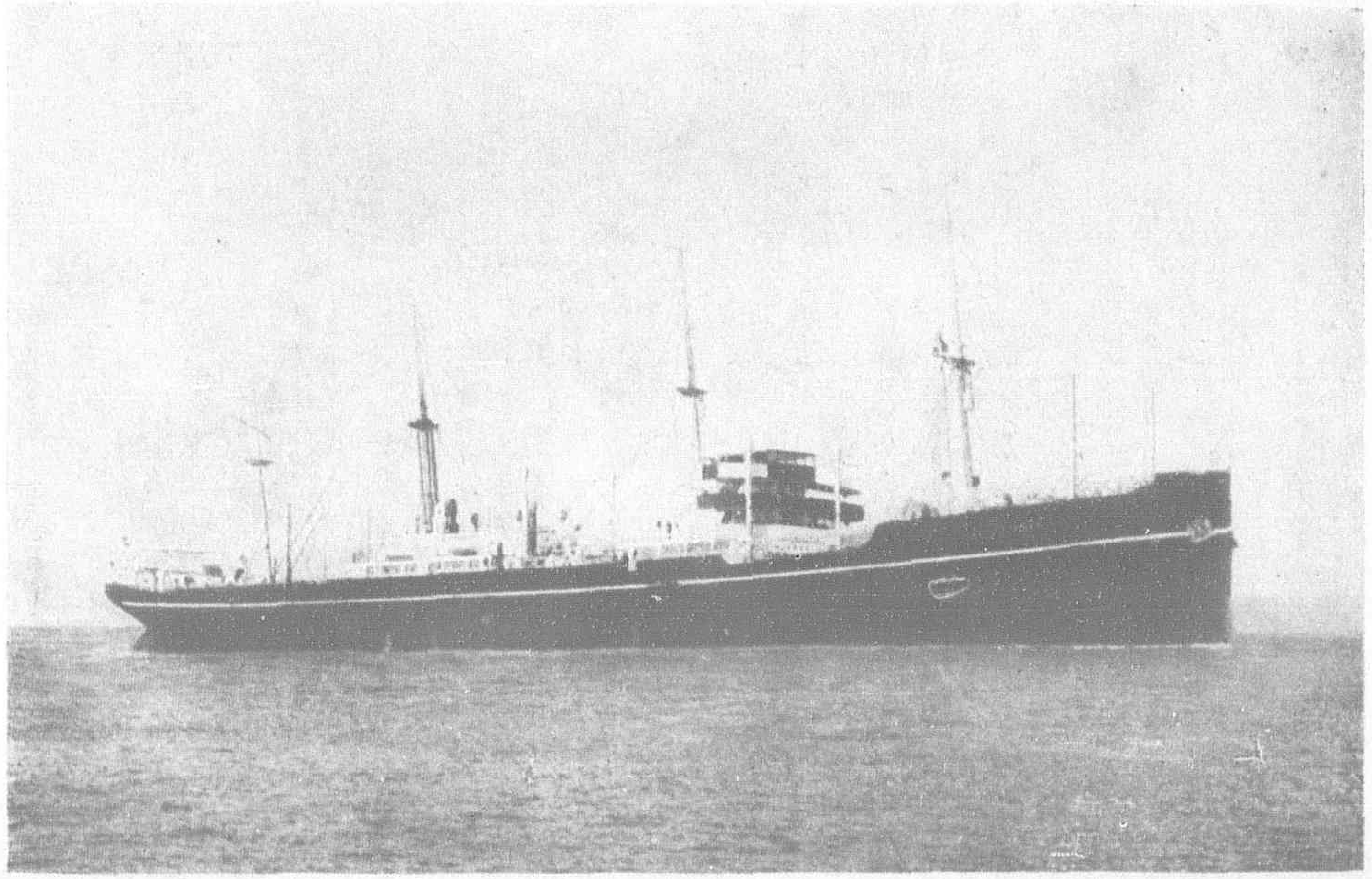
T.M.S. "Alsia"



T.M.S. "Lalandia"



T.M.S. "Meonia"



T.M.S. "Java"

The largest cargo Diesel-vessel launched from the Nakskov Shipyard Ltd., Nakskov, Denmark.

On Saturday, October 4, 1930, the motorship *India*, yard number 39, built to the order of Messrs. East Asiatic Company, Limited, Copenhagen, was successfully launched by Nakskov Skibsverft, Nakskov, Denmark.

On Wednesday, December 17, 1930, the *India* after a satisfactory trial trip in the "Langelandsbælt" left the builder's yard for Copenhagen for drydocking and arrived there the following day. Sunday, December 21, the trials were carried out in the Sound.

The vessel, which is built to the order of the East Asiatic Company and in conformity with the owner's special requirements for vessels engaged in their routes, embodies in many ways considerable improvements in comparison with the vessels previously built by the same builders, and special attention and care has been given to arrange this new vessel as practicable as possible.

The vessel is built to the highest class of Lloyd's Register of Shipping (+ 100 A. I.) and has the following principal dimensions :—

Length over all	488-ft. 0-in.
Breadth moulded	63-ft. 6-in.
Depth to upper deck	40-ft. 3-in.
Gross tonnage	9,549 tons
Nett „	6,031 „
Deadweight on Lloyd's summer freeboard	13,600 tons.

The propelling machinery consists of two Diesel motors of Burmeister & Wain's make (8 by 630-M) capable of indicating 7,100 h.p. which will give the ship a speed of 13½ knots in loaded condition.

The auxiliary machinery embodies three motors, each 3-cyl. 150 b.h.p. These auxiliary motors are supplied by Messrs. Holeby Dieselmotor Fabrik, Holeby. Each motor drives a dynamo of 100 k.w.

The ship is built with two complete steel-decks, and further a 'tween-deck is arranged forward in No. 1 hold. The holds are served by six exceptionally large hatchways and the cubic capacity is 832,000 cub. ft. grain.

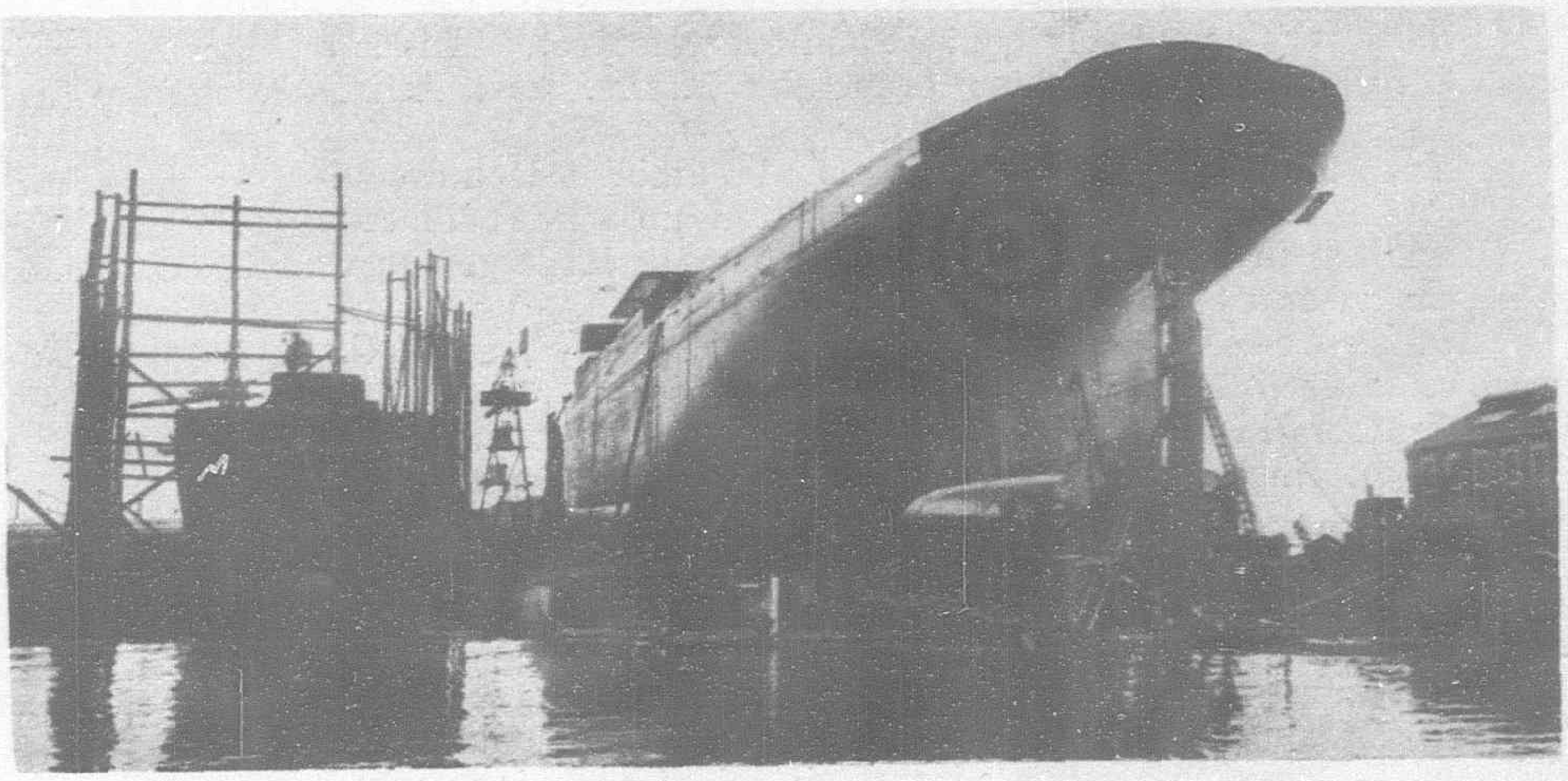
A modern cooling plant for about 21,000 cub. ft. is installed for carrying fruit or other perishable cargo. The minimum temperature of the refrigerating rooms is ÷ 12 Celcius. The machinery for the cooling plant is supplied by Messrs. Thomas Ths. Sabroe & Co., Aarhus, Denmark.

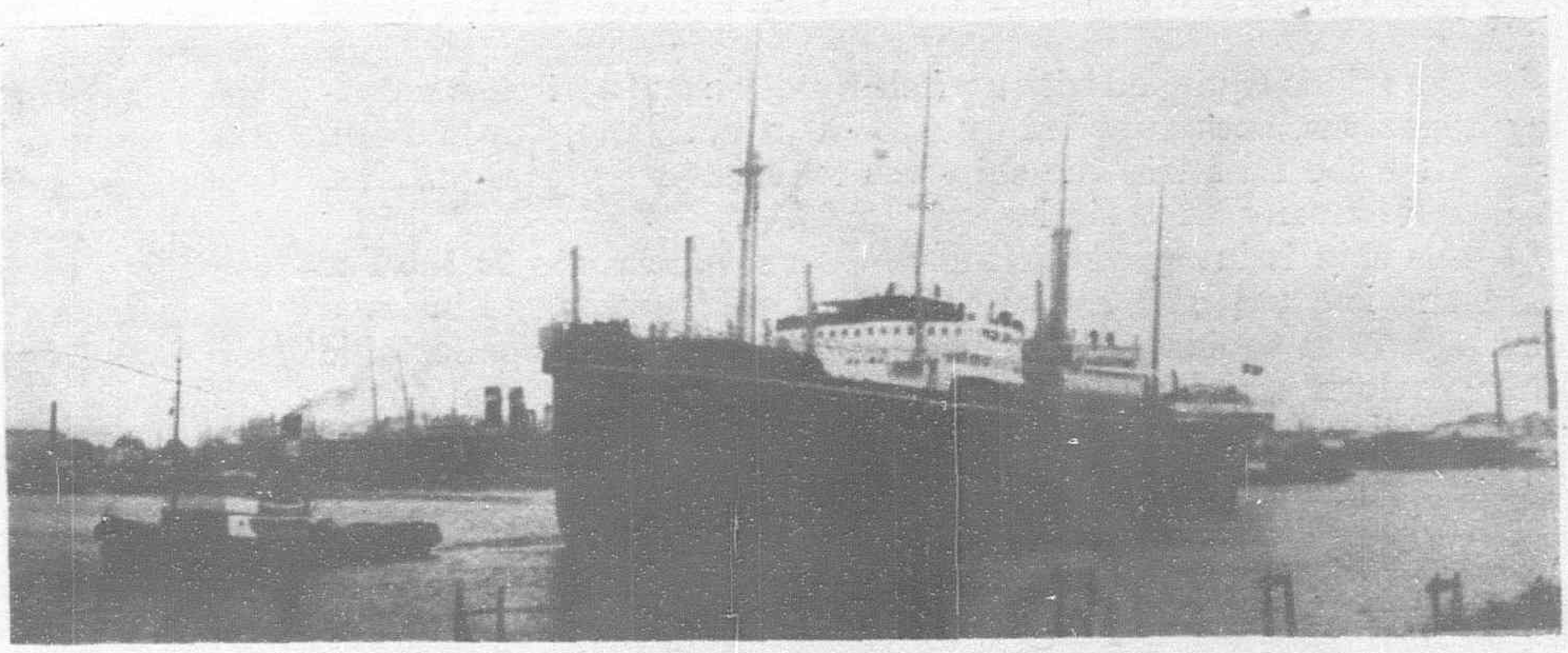
The ship is equipped with 18 cargo derricks with electrically driven winches made by the well known winch-makers, Messrs. Thomas B. Thrige, Odense. The winches have a lifting capacity varying from seven to three tons. In order to enable the ship to handle heavy loads without assistance of cranes ashore it is equipped with two heavy derricks capable of lifting 40 tons and 15 tons respectively.

The steering gear is electrically driven and supplied by Messrs. Thomas B. Thrige, Odense.

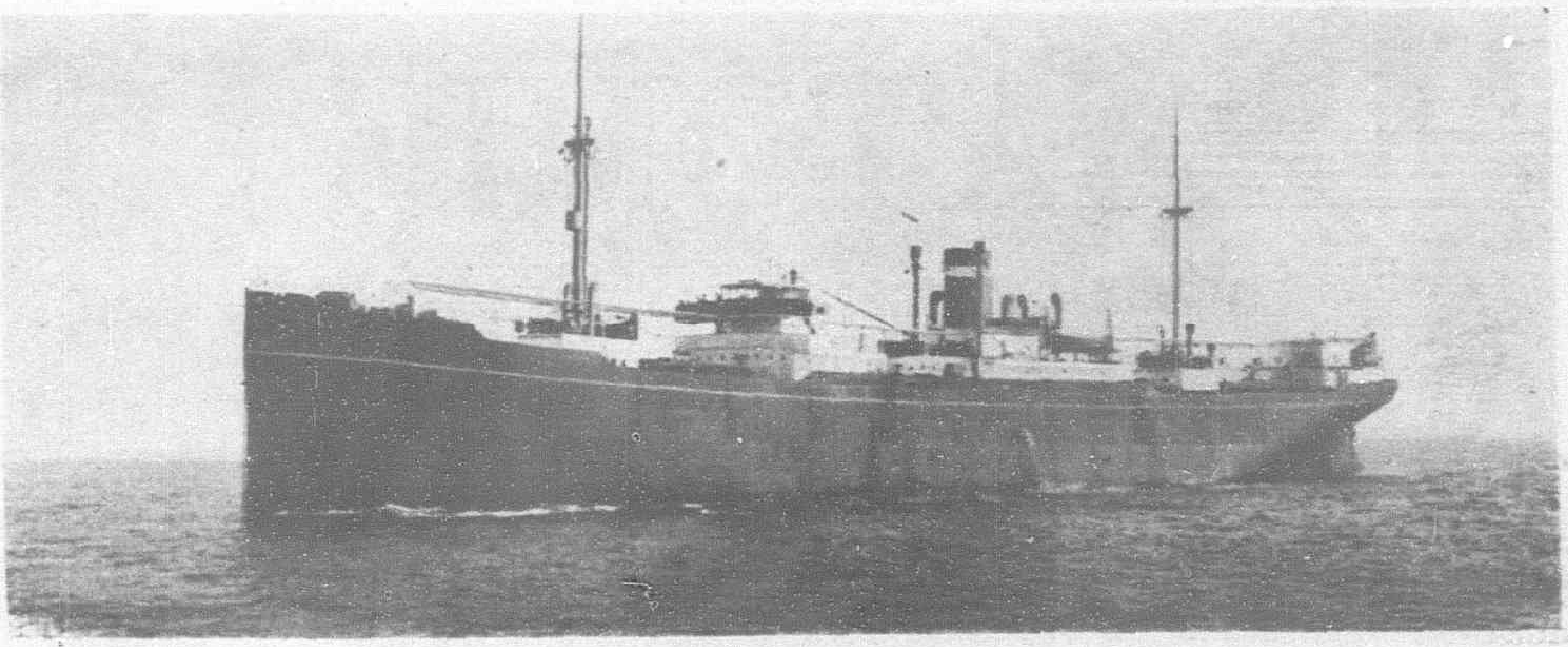
The windlass also is electrically driven and supplied by Messrs. Thomas B. Thrige, Odense.

The accommodation for the passengers consists of six state rooms capable of accommodating two passengers each. All the state rooms are exceptionally large and airy and furnished with comfortable beds and sofa beds, wardrobes, chairs, toilet—and writing tables etc. and each state room has its own adjoining toilet—and

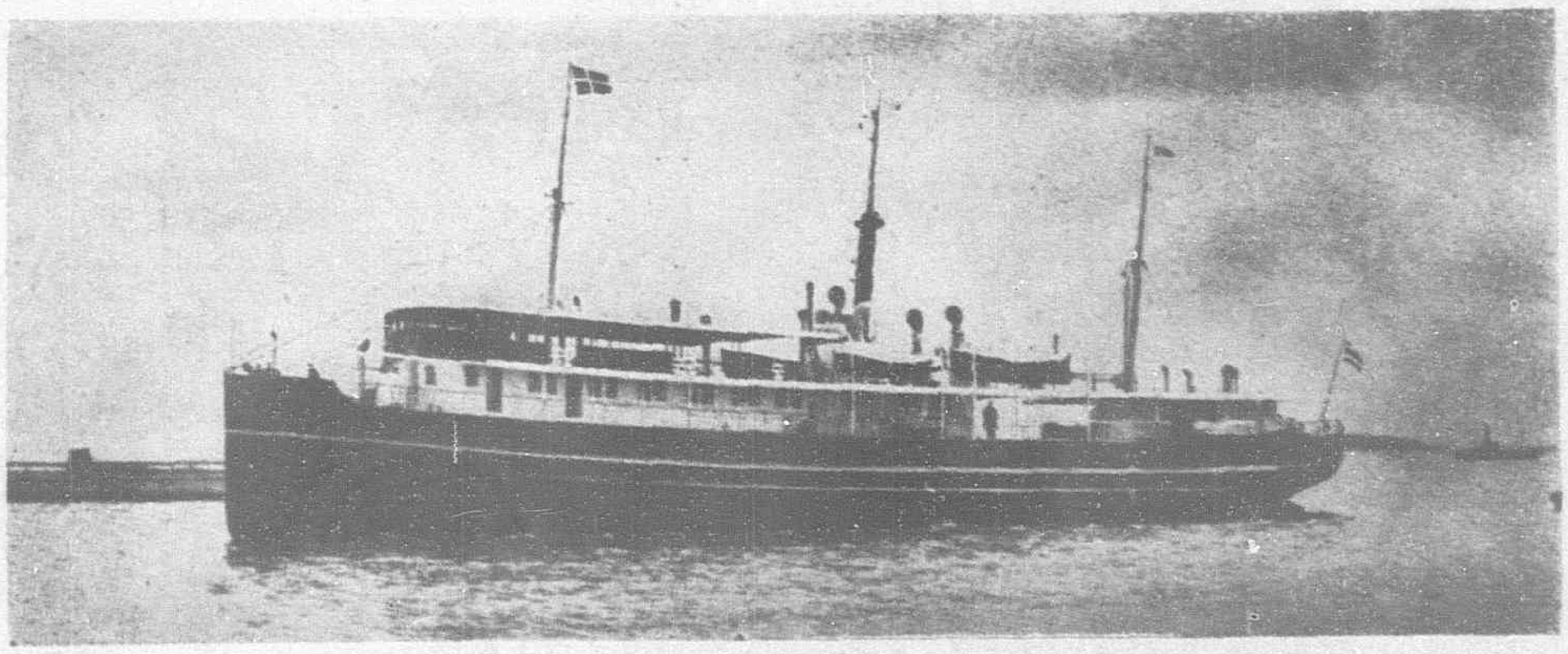




M.S. "India," 9,549 Tons Largest Motorship Launched from the Nakskov Shipyard Before and After Launching



M.S. "Olympia," Launched from the Nakskov Shipyard on October 18, 1930, for the Steamship Company "Orient" of Copenhagen



M.S. "Bhanurangsi," Built by the Nakskov Shipyard for the Siam Steam Navigation Co., Ltd.

bath-room very completely equipped in every respect. This is a special feature for the ships owned by Messrs. East Asiatic Company.

In the foremost deck-house is situated a dining saloon accommodating 20 persons. The saloon is fitted up with bulkheads and furniture in polished mahogany and is with its large square windows an exceptionally light and pleasant room.

The smoke-room which is arranged in the deck-house on the promenade deck is fitted up in polished mahogany.

The floors in all saloons and state rooms are covered by the Kerkoid flooring supplied by Messrs. Rowan & Boden, Ltd., Glasgow.

The ship's galley is equipped with an oil-fired range supplied by "De Forenede Jernstöberier," Copenhagen, which firm also supplied the oil-fired baking-oven.

The cooling chambers for the ship's provision are very roomy. The machines for same being supplied by Messrs. Thomas Ths. Sabroe & Co., Aarhus. Further a large Frigidaire ice box is arranged for in the saloon pantry.

The life-boats are placed under Welin davits of the latest pattern.

The ship is equipped with a wireless station and a wireless sounding apparatus, both supplied by A/S Elektromekano, Copenhagen.

After the trial trip the ship was taken over by Messrs. East Asiatic Company as their largest vessel.

The ship is intended for the E.A.C's regular route to the Far East and is fitted with accommodation for 12 passengers in large and high class cabins with private bath and W.C. A comfortable dining saloon will be arranged in the deck-house on the bridge deck, while the smoking saloon will be situated in a deck-house on the promenade deck.

The Dutch Passenger Motorship "Baloeran"

(*Continued from page 126*).

holds and to the engine room. By means of a special device it is possible to allow the contents of two bottles to flow out simultaneously at two different spots in the engine room. These spots are fitted with hose couplings, so that the gas can be led directly through a hose to any desired spot in the engine room.

Amongst the most important installations on board are certainly the wireless plant and the apparatus for navigation purposes. The ship is equipped with a 2 kw. radio station for the ordinary communication with other ships and for sending telegrams to land stations. There is also a short-wave station which during the whole journey remains in touch both with Holland and with the Dutch East Indies. In cases of emergency, there is a sender which can transmit to several 100 miles. Two life-boats are also fitted with the prescribed wireless equipment. To help in navigating the ship, a wireless direction finder is provided. In addition to that, there is a gyro compass. This comprises a master compass and three subsidiary compasses, one of which is fitted in the direction finder. A course recorder, which is connected with the electric rudder-position indicator, records the changes in the course automatically for 30 days. A speciality for taking soundings is the echo transmitting apparatus, which generates very short sound waves every second. These are directed vertically downwards and are reflected back from the bottom of the sea. The apparatus catches the returning echo. The time elapsed between transmission and the reception of the echo, gives the exact depth of water, which is shown on a scale.

For loading and discharging cargo, there are eight cranes for three to five tons, and two cargo winches installed near the hatches. A three ton winch beside the engine room skylight serves for handling parts of machinery. All winches and cranes are electrically driven. On the forecastle deck there is an anchor winch, which is driven by machinery located in a room below it. Also the two warping winches in the stern and the four boat winches for the 16 boats are electrically driven, whilst the steering machine works on the electric hydraulic principle, being operated from the bridge by means of a telemotor.

On the trial trip, with a displacement of 19,000 tons and the engines developing 16,900 i.h.p. at 99 revs. per min., the ship attained an average speed of 18.8 knots. The maximum speed reached on this trip was over 19 knots.

ATOMIC DIESEL

COLD STARTING HEAVY-OIL ENGINE ELECTRIC GENERATING PLANTS

A PROVED SUCCESS!

TESTIMONIAL

"It will be of interest to you to know that the 160 B.H.P. ATOMIC DIESEL ENGINE (*illustrated in photograph*), direct coupled to a 100 K.W. Generator which you installed at our Works (*Glove Factory*) is performing its duties in a perfectly satisfactory manner. The Plant is supplying electricity to our Factory for both power and lighting, and fulfils in every way the high claims which you make. It is very economical and works for long hours without attention, and, due to the particularly steady running on all loads, there is no perceptible variation shown by the electric meters."

Petter Generating Plants are made in sizes from ¾ K.W. to 270 K.W. for providing Electric Light and Power for Farm, Home, Shop and Factory, Public Buildings, Towns, Villages, etc. Automatic or hand control. Write for Catalogue.

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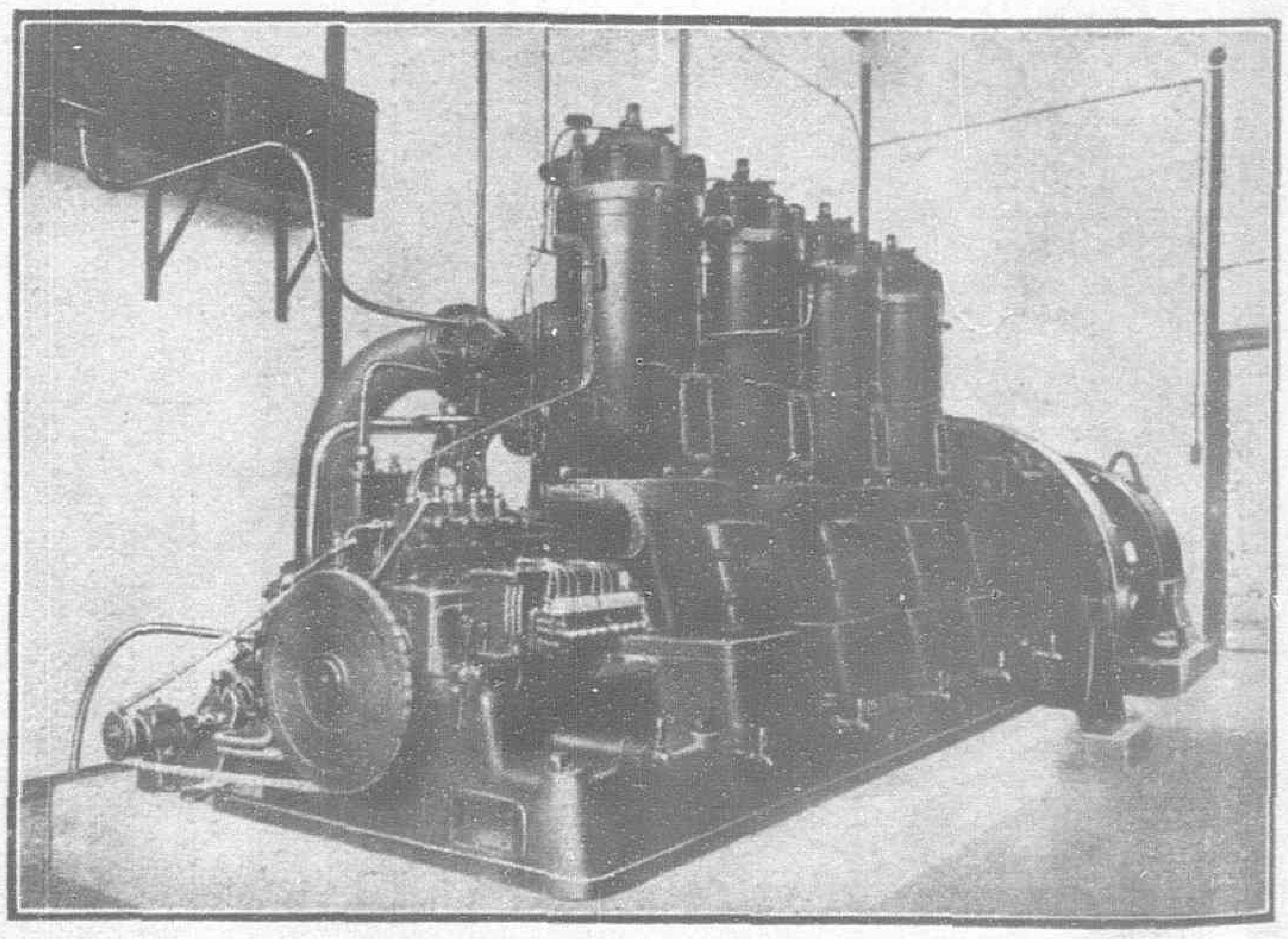
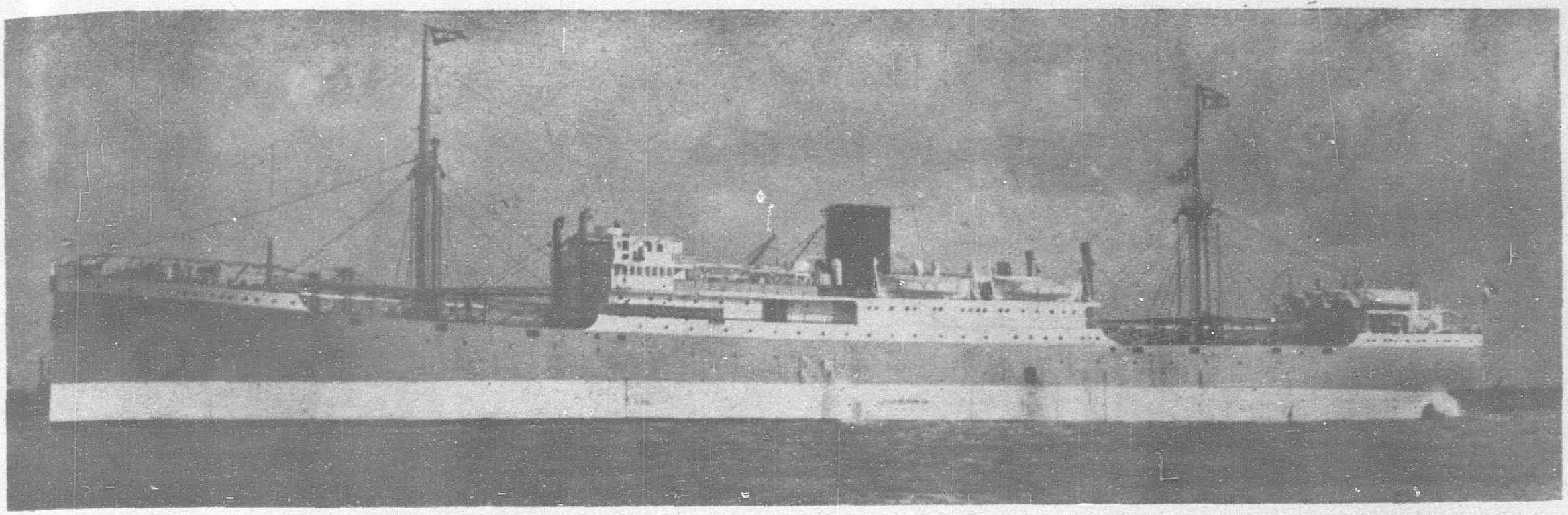


The Product of 35 Years' Experience in Oil Engine Manufacture



M.S. "Kota Agoeng" Built by Messrs. Wilton-Fijenoord for the Rotterdam Lloyd Far Eastern Services; Propelled by M.A.N. Diesel Engines

"Kota Agoeng"

New Rotterdam Lloyd Liner, Propelled by M.A.N. Diesel Engines: Built by Messrs. Wilton-Fijenoord

THE *m.s. Kota Agoeng*, the sister ship of *Kota Inten*, *Kota Gede* and *Kota Tjandi*, all of them being built at the same dock, has the following dimensions :—

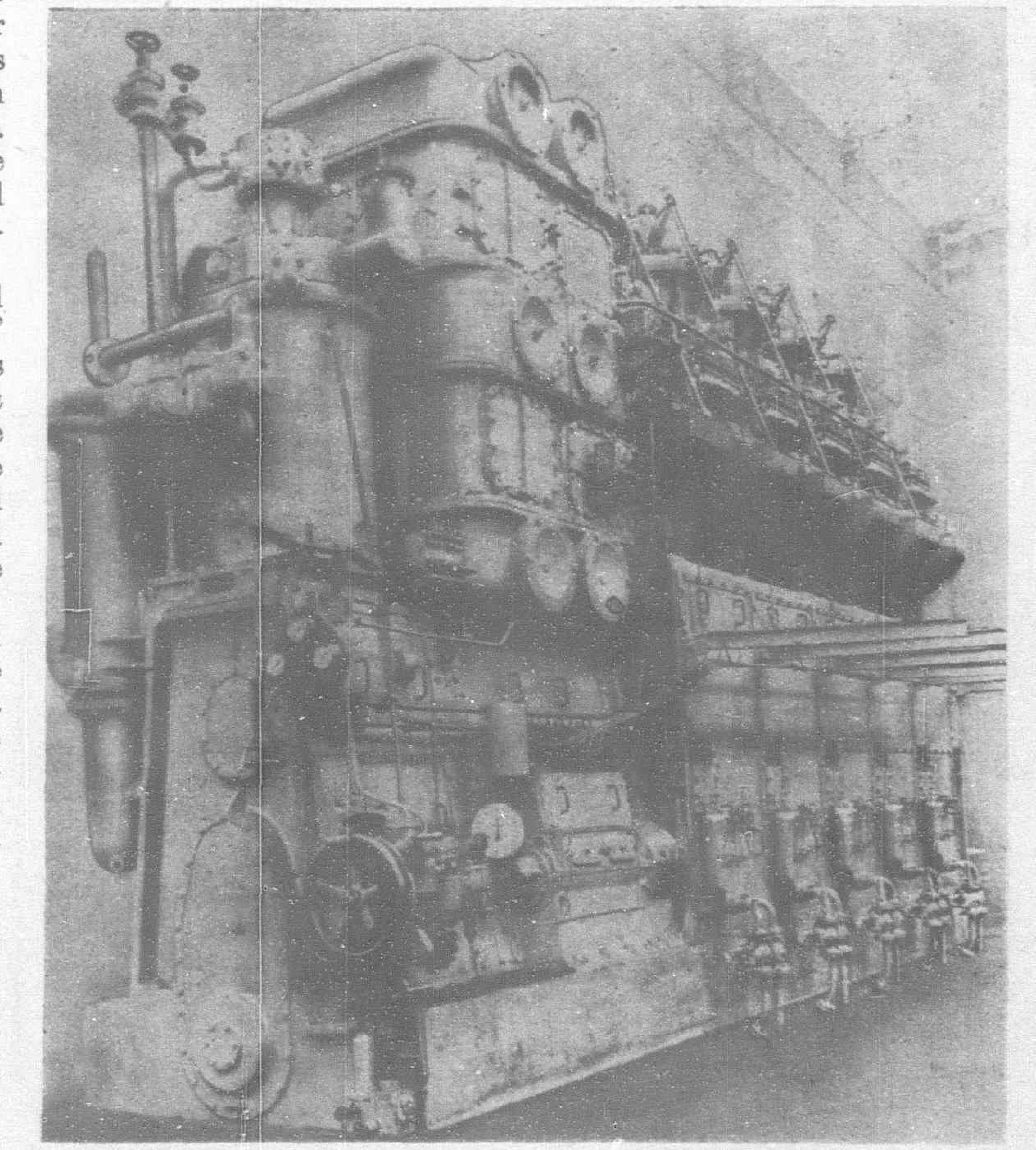
Length between P.P.	448-ft. 4-in.
Breadth	60-ft. 6-in.
Height	33-ft. 6-in.
Draft with summer free board ..	26-ft. $7\frac{1}{4}$-in.

the ship having a capacity with summer free board of 9,640 tons gross, and net displacement of 7,331.53 *viz.* 4,600.56 registered tons, from which may be seen that the boat has a capacity of 140 tons in excess of the other "Kota" ships due to the lower engine weight. The boat has been built in accordance with the highest class British Lloyd. It is in conformity with the requirements of the Dutch Board of Trade, and of the requirements for pilgrims transport.

The boat has three decks and has a "Star Contra-Propeller" with rudder. The motorships *Kota Inten*, *Kota Gede*, *Kota Tjandi* and *Kota Pinang* have "Oertz" rudders. But the "Star" installation is looked upon with more interest, and special favorable results are expected from its use.

The boat has been destined for fast freight service to the Dutch East Indies, having a speed of 14 knots. Comfortable cabins for 14 passengers are provided. In the 'tween decks there is room for 1,300 Mecca pilgrims.

The double bottom of the boat is to hold fuel-oil, cooling water, drinking water and water ballast. Deep tanks for vegetable oils are provided. Furthermore, refrigerating space of a capacity of 57 cbm. is available, and cooling and chilling rooms as well as an ice plant and cooler for drinking water are installed.



Two 750 shp. M.A.N. High Speed, Double-acting, Direct-reversible, 5-Cylinder Diesel Engine for M.S. "Kota Agoeng" on Test Bed in M.A.N. Works

To facilitate the loading and unloading of the ship, there are 11 5-ton winches, four 3-ton winches and two derricks installed. forty ton loads can be handled by the ship's own tackles.

All deck machinery, including rudder and winches, are electrically driven.

The propelling machinery is entirely different in design of the power-plants of the other "Kota" ships. Whereas the other "Kota" ships are each propelled by one double-acting, 2-cycles, 7-cylinders M.A.N. Diesel engine of 86 r.p.m., the *m.s. Kota Agoeng* is propelled by two high-speed M.A.N. type, double-acting, direct reversible, 5-cylinder Diesel engines, each having an output of 2,750 shp at 215 r.p.m., whereby the mean effective pressure is 4.12 kg/sq. cm. The power of these two engines is transmitted to the propeller shaft by Vulcan gears, as shown in the accompanying photographs. Of the 5,500 h.p. about five per cent is lost in the hydraulic clutches of the gear, so that the propeller shaft is driven actually with 5,200 shp.

The cylinders of the two main engines, having a diameter of 520 mm, 700 mm stroke are assembled in one group. Scavenging pump and air compresser are built on to the engine and driven off the front end of the crank shaft. As to the remaining constructive details, they are the same as with the other M.A.N. types of Diesel engines of this output. The construction is, we presume, known well enough, so that it may be omitted here.

Special care had to be taken in order to get all the piping properly installed. But not only this; one has made it a point to eliminate as much as possible all the noises from the intake of the air. By installing special by-pass valves into the air suction lines, air may now be taken also from the space below the engine-room floor, which fact insures good ventilation there.

The two main engines are seated immediately upon the double bottom. The cylinder water jackets and cylinder covers are cooled by fresh water. Special Drysdale pumps have been installed to insure proper circulation of the cooling water as well as of the cooling oil. The pumps, of which one is meant for stand-by purposes, are electrically driven.

The forced-feed lubrication is operated by two special electrically driven Stothert & Pitt pumps. The two pumps are, in order to save space, installed on top of the oil re-coolers.

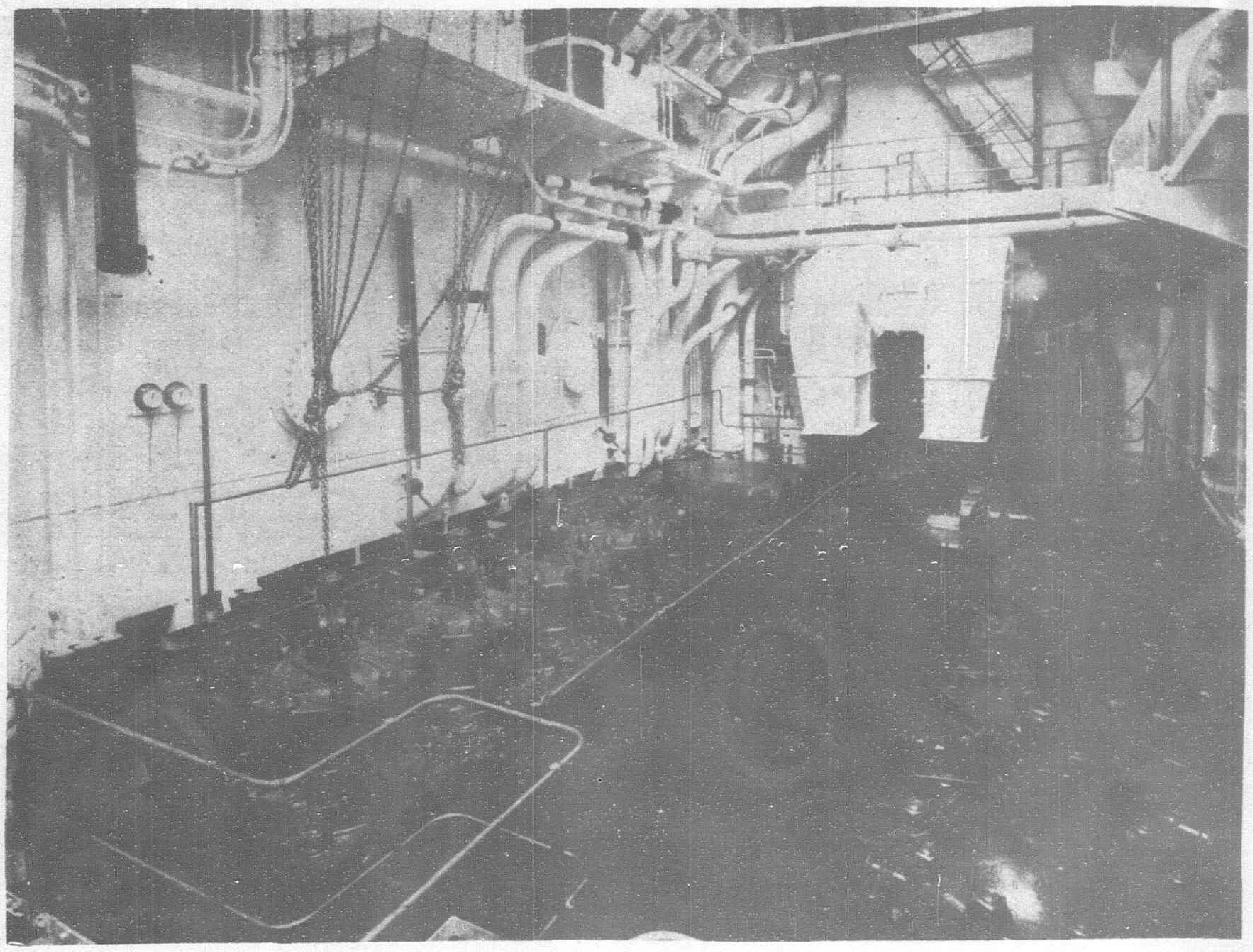
The sea water to cool all the above mentioned systems is taken from out-boards by special electrically driven centrifugal pump, having a capacity of 380 cbm/hr. As a stand-by for this pump, another electrically driven ballast pump of 320 cbm/hr. is installed.

The Vulcan gear, consisting of simple geared transmission is having hydraulic couplings to connect them with the Diesel engines. These couplings have the great advantage of being more elastic than all couplings so far known. The elasticity of these couplings is such, that the propeller shaft was allowed to be designed in accordance with the rules as ordinarily used for steam turbine drive. This means that the saving in weight of the line shaft here as compared with the line shaft of other ships is about 20 per cent.

The M.A.N. high speed Diesel engine can be built, as far as critical speeds go, in such a way that the critical torsional vibrations of the motor shaft, with the coupling thrown in, are in so high a region that there is no critical speed appearing at all within the speed range of operation of the engines.

Another great advantage in the use of a twin engine installation, transmitting it power by means of a Vulcan gear to one propeller shaft, lies in the fact, that in case a lower speed of the boat is required, one engine may be shut down entirely, and only one engine be run at full load, thus giving the best possible fuel consumption. In case of engine trouble of one set, there is no need to stop the boat, but repairs may be carried out while the other engine is running. The manoeuvring in the harbor can be performed mostly with one engine, so that the starting-air consumption is comparatively low. This makes it possible to foresee a smaller number of starting air tanks, with subsequent saving in weight.

The high speed engine has the additional great advantage of being much lower built than engines of slower speed.

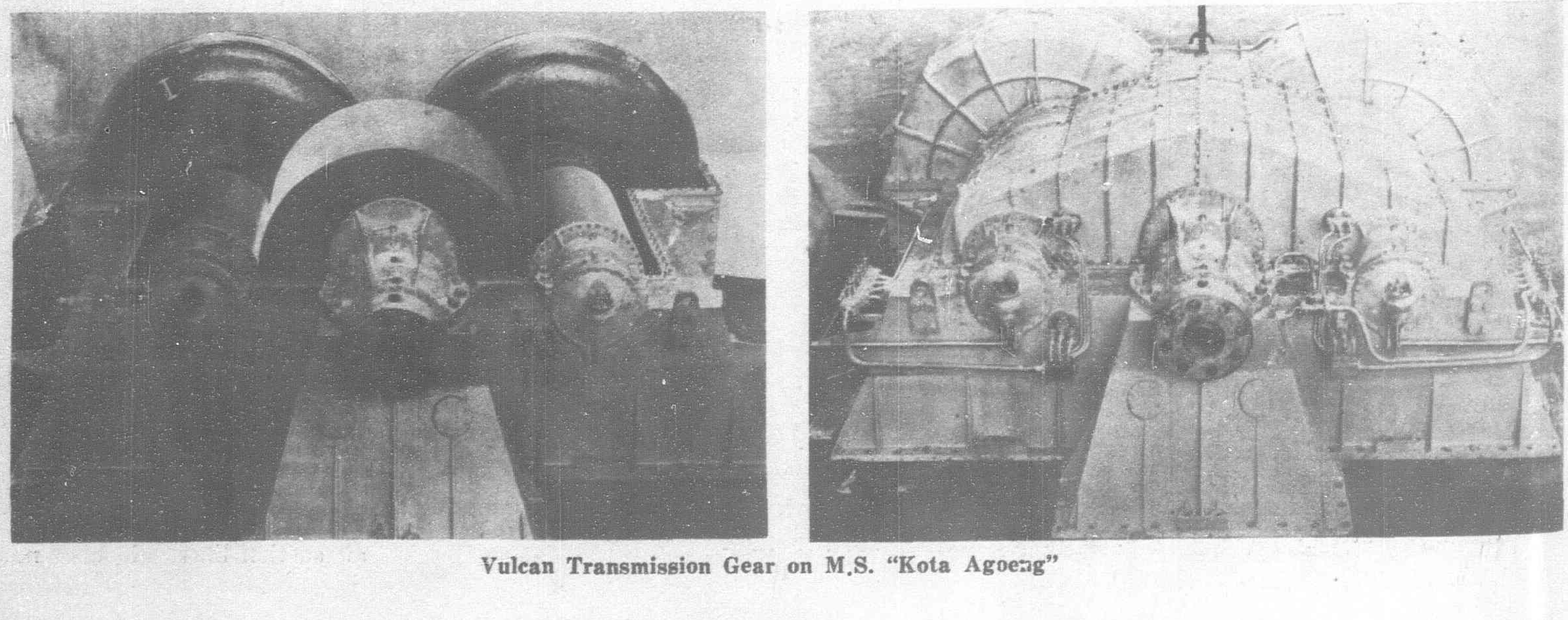


Top of Engines: M.S. "Kota Agoeng"

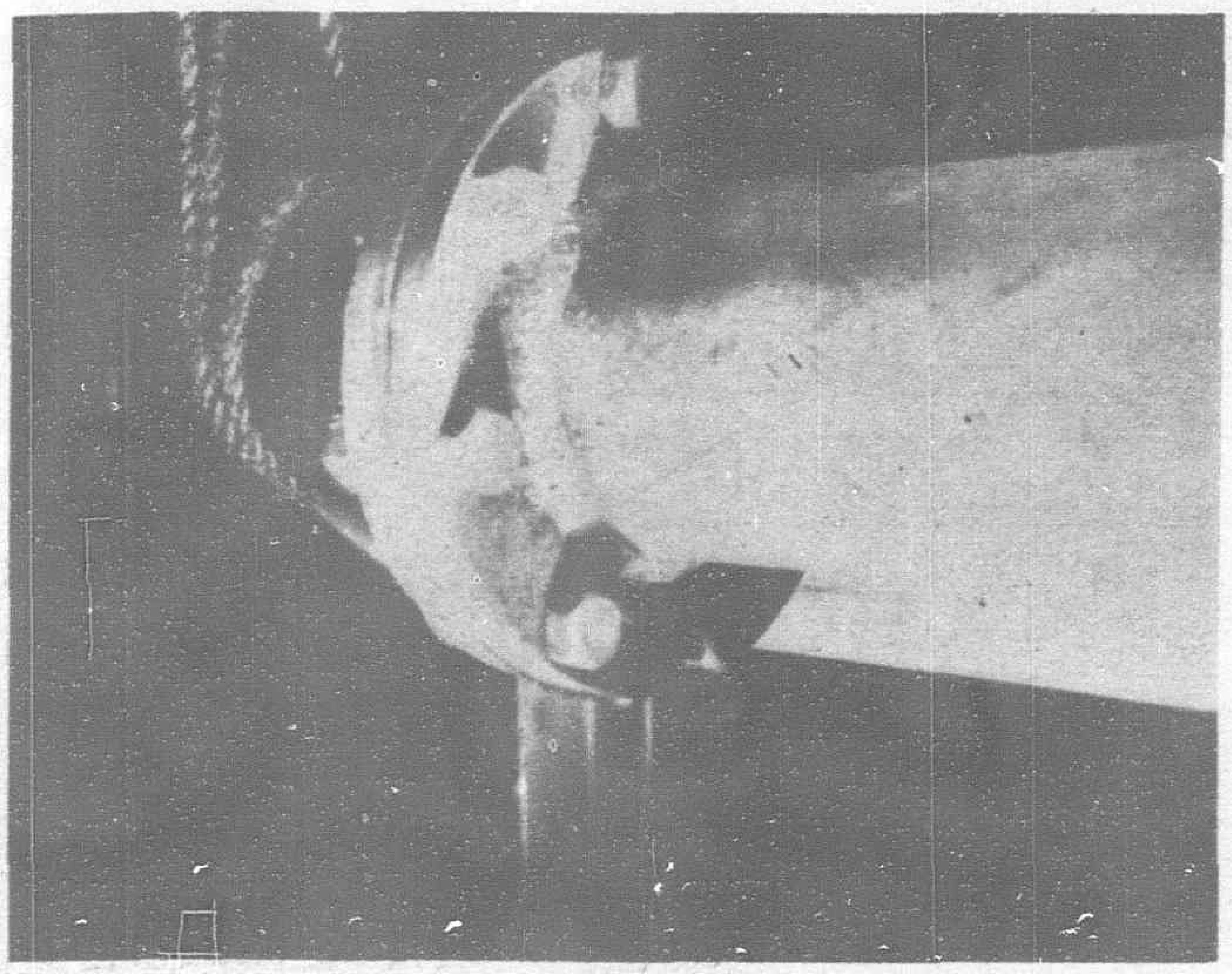
Auxiliary Machinery

All the machinery as well as all pumps and winches are electrically driven. Two Diesel-generator sets of 200 kw. each, consisting of 4-cylinder M.A.N. type Diesel engines and direct-connected generators are provided. The Diesel engines are built at the Fijenoord Works under M.A.N. license. They are working ordinarily on the solid injection principle, but in case of only lower grade fuel being available, may be transformed quickly into Diesel engines with air injection The auxiliary engines are cooled by sea water. Each of these two Diesel-generator sets is sufficient to supply all the power necessary, so that one is always in reserve.

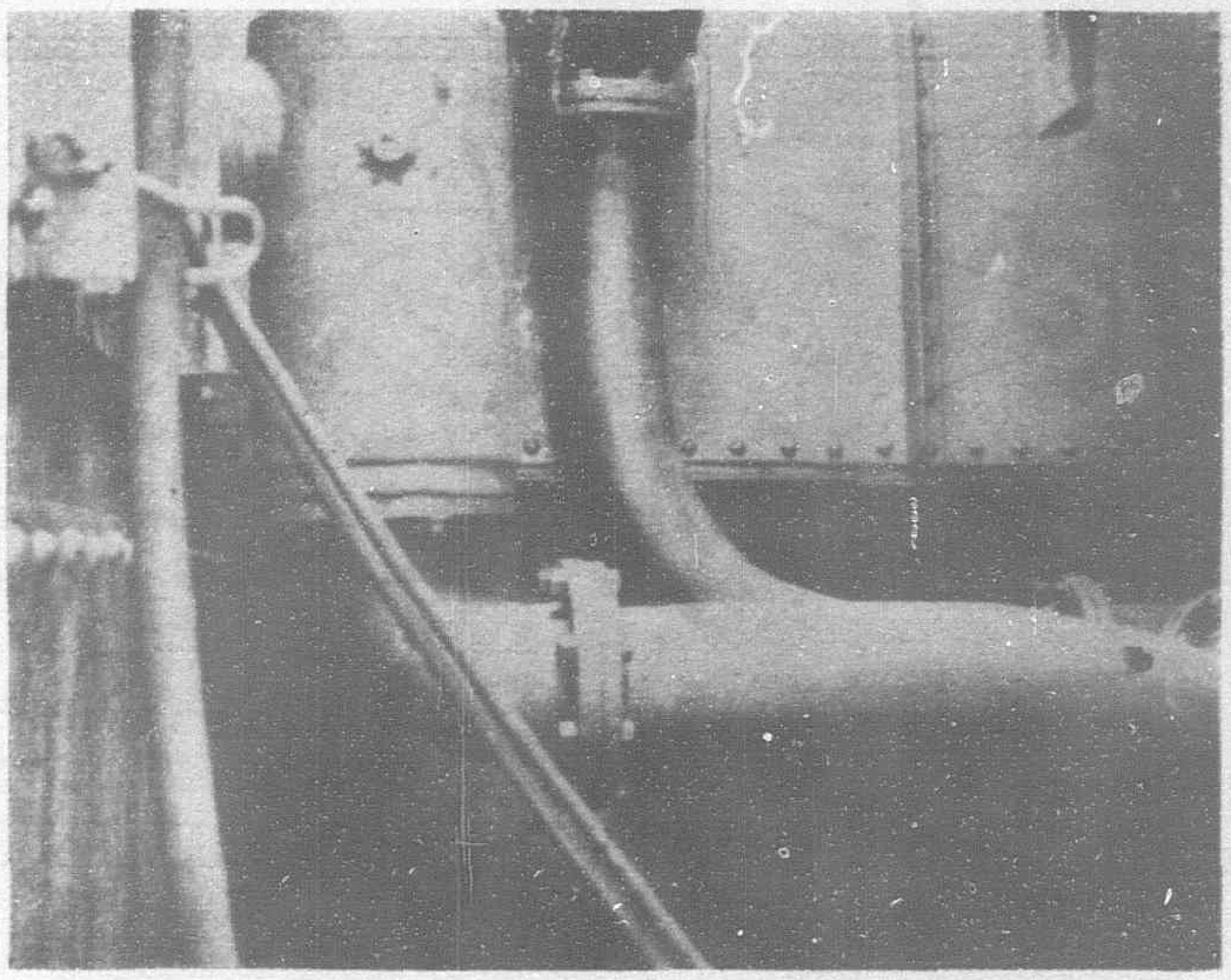
(Continued on page 133).



Vulcan Transmission Gear on M.S. "Kota Agoeng"



Showing Flange Welded to Pipe



Four inch and Six inch Oil Fuel Pipe Lines with Welded Flanges and Welded Expansion Tank

Pipe Welding in Ship Construction

Work Much Simplified and Greater Efficiency Obtained

In ship building and ship repair the Oxy-Acetylene Cutting and Welding Blowpipes are used very extensively for welding and brazing, for heating and of course for every kind of cutting. In this article, however, we intend to deal more particularly with pipe work. In a modern vessel using crude oil burners a great deal of piping is necessary. Owing to the limitations of space available, the shape of the hull, etc., many unusual fittings would be required to install the pipe lines, which would have to be specially manufactured for the job. It is here that the cutting and welding blowpipe is of special value, enabling engineers to lay out their lines with the greatest economy of space and weight, at the same time obtaining positive leak proof connections.

Oxy-Acetylene welding is particularly employed on the oil fuel lines, suction and filling. These lines were not butt welded in the case referred to in our next paragraph but were flanged, the flange being Oxy-Acetylene welded to the pipe. This welding was done in the usual manner, that is, the flanges were V'ed on both sides and fitted to end of pipe. An interesting feature in the welding of this pipe line is to be found in the flexibility thus made possible. Owing to the many angles of the pipe it would have been extremely difficult to have fitted screwed connections or flanges. When welding however, the flanges are put on the pipe, drawn up into position and then tack welded.

The pipe lines can then be taken down and the welds completed in the shop or in a convenient location on the job. Thus perfect fit is insured.

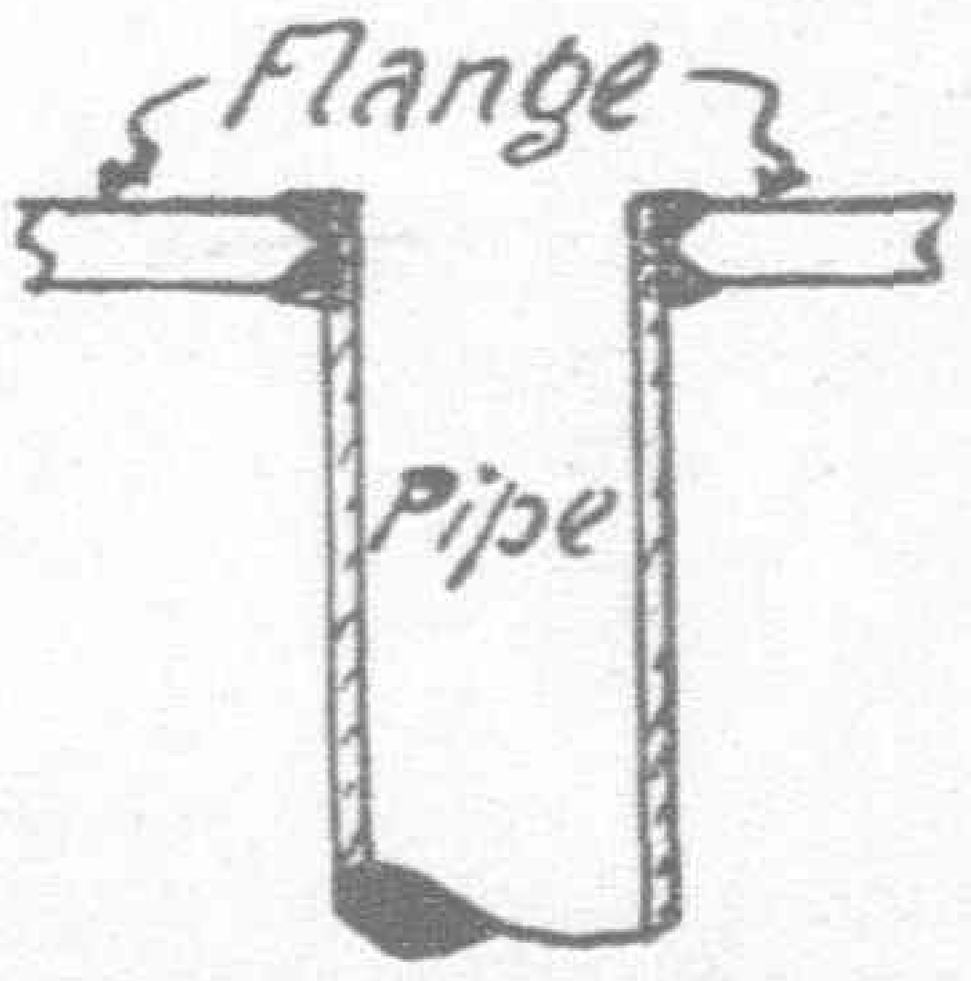
To give some idea of the amount of pipe that is used, we would mention that in an ice breaker recently constructed at the Halifax Shipyards, about the following lengths of wrought iron pipe with Oxy-Acetylene welded flanges and fittings were used.

200-ft. of 4-in. fuel pipe (oil suction) with 70 flanges.
300-ft. of 5-in. fuel pipe (oil suction) with 100 flanges.
120-ft. of 6-in. fuel pipe (oil filling) with 35 flanges.

In addition to the above there was the forced feed oil line which however, was not welded. There were also many feet of water pipe and air pipe on which however, flanges and connections were electric welded.

Apart from these lines, heavy copper ballast pipes were installed connecting the various ballast tanks. These pipes were in innumerable shapes, such as various bends, U bends, off-sets and twists. The ballast pipe consisted of four sizes, 14-in., 10-in., 8-in. and 6-in., These pipes owing to shape and size had to be specially manufactured on the job. In all cases the cast brass flanges with which they were fitted were brazed on with the Oxy-Acetylene torch. Owing to the size and weight of these flanges it was necessary to use two torches to do the work, one large Oxy-Acetylene heating torch and a welding torch also equipped with a large tip. The flanges were first heated after having been fitted in the correct position. Thereafter it was an easy matter for the welder to thoroughly braze the flanges to the pipe. The following quantities will give some idea of the size of this job. There were about 60—14-in. flanges, 35—10-in. flanges, 12—8-in. flanges and 15—6-in. flanges.

Photographs illustrate both the welded flanges on wrought iron pipe and on ballast pipe.



Method of Preparing Flanges

"Kota Agoeng"

(*Continued from page 132*).

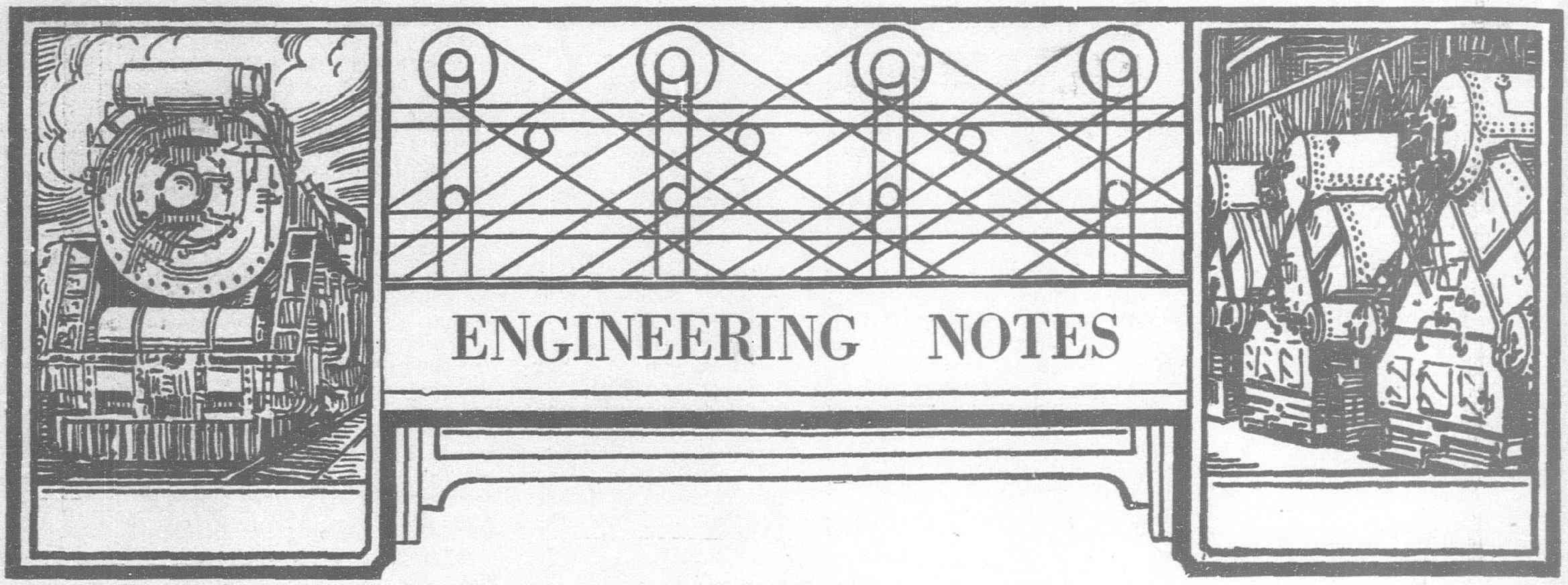
Naturally, all the other required auxiliary engines, like compressers, sanitary pumps, fire engines, etc., are all provided with sufficient capacity and also air compressers are foreseen to supply the starting and manoeuvring air in the main—and auxiliary Diesel engines.

All fuel oil for the motors is being cleaned, for which purpose two De Laval centrifuges, each with a capacity of about five tons per hour are installed. Furthermore, an electric fuel-oil heater is provided.

To clean the lubricating oil for the main engines, Vulcan gears and auxiliary machinery, two Sharples centrifuges are installed.

To make the equipment of the engine complete, auxiliary bilge pumps and two drinking water pumps are provided. A small shop is built in, and is equipped with a combination tool consisting of lathe, planer, miller and drill press.

If one compares the total weight of the engine plant with the usual one of motor ships propelled by slow speed engines of equal shaft h.p. we can see a great advantage in the use of the high speed engine, in spite of the fact that more auxiliary machinery is needed by the use of the Vulcan reduction gearing. The weight of the installation of the *Kota Agoeng* is 175 kg/shp of installations of slow speed engines, which means that the high speed installation shows a saving in weight of about 17 per cent.



ENGINEERING NOTES

ELECTRIC LIGHT, POWER AND TRACTION

HULAN SUGAR REFINERY POWER HOUSE :—In order to unify the conrol of electricity enterprises about the Harbin district, the Harbin Electricity Co. (the Tienyeh Kungsus), a Chinese concern, Harbin, has bought up the power house belonging to the Hulan Sugar Refinery Co. for $158,000.

TRACKLESS ELECTRIC TRAMS FOR TOKYO :—The trial operation of trackless electric trams in Honjo Ward will be undertaken by the Tokyo Municipality in the course of the next fiscal year.

If this experimental service should turn out successful, the service will be extended in various parts of the city with a view to relieving the present congestion of service.

POWER PLANT REGULATIONS.—In compliance with petitions from the National Association of Public Utility Corporations, the Legislative Yuan is considering a revision of the Regulations governing the Supervision of Private Electrical Enterprises.

The provision in the present Regulations stipulating that after the lapse of twenty years, the Government may take over and purchase the interests of any private electrical utilities will be revised so as to provide for the change of the period from twenty to thirty years.

Notwithstanding the petitions, the provision to the effect that foreign capital shall not be allowed in private electrical utilities will not be revised.

Another revision under consideration deals with the case of a given enterprise subject to the jurisdiction of two or more Provincial Governments. In such event the Central Government, instead of the two Provincial Governments as provided in the present regulations, shall exercise the power of supervision.—*Kuo Min.*

Nanking, February 22.—A revision of the Regulations governing the Supervision of Private Electrical Enterprises was adopted at the 132nd meeting on the Legislative Yuan yesterday.

Article 14 of the Regulations stipulating that after the lapse of twenty years, the Government may take over and purchase the interests of any private electrical enterprise has been revised so as to provide for the extension of the period from twenty years to thirty years.

Notwithstanding petitions from the Association of Public Utility Corporations, no revision was made of Article 11 which provides that foreign capital shall not be allowed in privately-owned electrical utilities.

With regard to cases where an enterprise is subject to the jurisdiction of two or more Provincial Governments, it was decided that inasmuch as the logical interpretation of Article 3 is that in such cases the Central Government shall exercise the power of supervision, there is no necessity to make any revision as petitioned for by the Association.—*Kuo Min.*

SINGAPORE POWER EXTENSION :—The Singapore Municipal Commissioners has recommended :

(1) That the sum of $434,346 be provided by new loan for extensions to Electrical Power Station, and new mains to Bedok and 7th mile Upper Serangoon Road.

(2) That 1931 Budget be amended by transferring items $125,000 for Electrical Department Staff Quarters and $230,000 for New Mains, from Revenue Account to Loan Account.

RAILWAYS

CHAOYANGCHEN RAIL LINE :—The Shenhai Railway Administration has submitted a plan to the provincial government for the building of a branch line from Chaoyangchen to Fushun. The estimated cost is $2,110,000.

LUNGHAI RAILWAY EXTENSION :—The engineering work for the construction of the Lingpao-Tungkwan section of the Lunghai Railway is making satisfactory progress and the undertaking will be completed within six months, according to Mr. Chien Tsung-tse, Managing Director of the Lunghai Railway Administration.

TUBE TRAINS FOR TOKYO.—Negotiations are making steady progress between the Municipal authorities in charge of the tram car system and the leading business magnates of the city for the conclusion of an agreement on the proposed construction of the Tokyo underground railways as a joint enterprise.

The Tokyo Municipality at first attempted to raise the necessary funds by means of a loan bond issue, but the Government hesitating to give its approval to the project in the light of its policy, which is opposed to loans, the authorities have turned to business men for aid. The recent conversations resulted in a definite agreement for the undertaking of the scheme and details will be discussed by a committee to be appointed for the purpose in the early part of January.

NANKING TRAIN FERRY.—By order of Mr. Sun Fo, Minister of Railways, engineering work on the new train ferry service between Hsiakwan and Pukow must be hastened. In order that the program for through communications between the Tientsin-Pukow and Shanghai-Nanking Railways may be carried out as soon as possible, it is expected that the work of construction will be completed by March next year.

Engineering work on the train ferry was initiated on December 1, last year. Since then work has been in progress at both ends of the service at Hsiakwan and Pukow. The structure is designed to carry complete trains of 10 locomotives and cars to or from the Tientsin-Pukow and Shanghai-Nanking Railways.—*Kuo Min.*

NEW RAILWAY WHARF AT YINGKOW :—In order to increase traffic on the Peiping-Liaoning Railway, plans for the building of a large wharf at Yingkow capable of berthing steamers of 3,000 tonnage, have been made by the Railway Administration. Godowns near the wharf are also to be constructed. The cost of construction is estimated at $540,000 and the work is to be completed in four months. Actual work will be started in spring after the ice has thawed.

CHINESE RAILWAY ENGINEERS TO STUDY JAPANESE METHODS :—In an order to the various Government Railways in the country, the Ministry of Railways announces its intention to send a delegation to study the railway workshops in Japan. The members will be drawn from the senior workshop staffs, upon the recommendation of the Managing Director of the respective Lines. Members of the inspection party are due to assemble at the Capital on April 20, whence they will proceed to Japan.

JAPANESE ROLLING STOCK FOR KIAO-TSI RAILWAY :—The Purchasing Commission of the Ministry of Railways has placed orders with two Japanese firms for the supply of four locomotives at $30,000 gold each and 100, 40-metric tons steel wagons at $1,750 gold each for the Kiaochow-Tsinan Railway.

The locomotives will be manufactured by the South Manchurian Railway Company, at their Shakako Works. They will be of the "Mikado" type having a tractive power of 36,090 lbs. each. The contract calls for the delivery of these locomotives in August. The Mitsui Bussan Kaisha of Shanghai is the contracting firm for the locomotives. The steel wagons will be manufactured by the Kisha Seizo Kaisha, Ltd., of Osaka, Japan. Delivery is to be made by the contracting firm, K. Takaiwa and Company of Shanghai, in five months.— *Kuo Min.*

INDUSTRIAL

NEW COKE PLANT, TOKYO.—The Tokyo Gas Company will organize a coke company with a capital of Y.10,000,000 to cover the decrease of income due to the reduction of the supplying charges.

GOVERNMENT IRON AND STEEL WORKS.—The Ministry of Industry has appointed a Preparatory Committee for the early establishment of a Government Iron and Steel Works. The Committee is composed of Messrs. Hu Shu-hua, formerly connected with the Shanghai Arsenal, Weng Wen-hao (Director of the Geological Survey), Wu Chien, Yen Chuang (Head of the Ministry's Labor Department), Hu Po-yuan (Head of the Mining Department) and Wang Chung-yu (Mining Expert).—*Kuo Min.*

NEW TRAM LINE, MUKDEN:—The Mayor of Mukden, is planning to lay a tram line from Outer West Gate, to the entrance to North Mausoleum. Work is to be commenced right after the thaw.

NEW INDUSTRIES IN MACAO:—It is interesting to observe that several new industries have been established at Macao. One of these is the manufacture of batteries for electric torches, another is an ice plant, and a third is a brick making plant. All the factories mentioned are provided with the latest electrical equipment and the managers in every case have come equipped with knowledge acquired abroad.

GOLD MINES IN MANCHURIA:—Government authorities of the Northeastern Provinces announced the discovery of a number of highly rich gold mines in Kirin and Heilungkiang Provinces and their intentions to develop them intensively in the near future.

A competent staff of mining engineers have been for some time in the field prospecting and have just sent in a most favorable report about their discovery of rich gold veins in parts of Kirin and Heilungkiang which have been hitherto inaccessible on account of bandit activities.

TRACKLESS TRAMS KYOTO:—The Kyoto City Electric Bureau's plan for operating trackless trams over the sparsely populated sections of the city bids fair to get under way before long.

The Bureau last October asked for Y.100,000 appropriation of the City Assembly for buying several such trams from England for experiments, and the matter was referred to the attention of the special committee in question.

The latter upon studying trackless trams from many angles, found that they cost less to build and maintain than regular trams running over tracks and can net greater revenue than petrol-driven buses.

PAPER MILLS IN MANCHURIA:—The Yalu Paper Mill has arranged to enlarge its operations by borrowing Y.2,500,000 from Japanese banks, proposes to instal additional equipments for putting out 1,000,000 lbs. newspaper paper and imitation paper in demand in China, on top of 1,500,000 lbs. of paper which was the annual producing capacity of the mill.

It is also reported Marshal Chang Hsueh-liang is planning to raise $2,000,000 for the erection of a paper mill with motive power derived from the Sungari waterfalls. An expert has been sent to Huatien, in South Kirin, to investigate the possibilities of this plan.

Another new paper mill is being erected at Fushun. It includes a boiler room, a machinery room, a boiling plant, a finishing room, a manufacturing plant, and a godown.

The raw material, will be "kao-liang" stalks. Waste paper and waste hemp will also be utilized.

The total annual import of paper into Manchuria amounts up to 10,000 tons, worth Y.15,000,000, including Y.6,000,000 of foreign paper, inclusive of newspaper paper.

EXHIBITION OF BRITISH CHEMICAL PLANT:—The British Chemical Plant Manufacturers' Association has arranged to hold an exhibition in London from July 13-18, 1931, of all types of plant, apparatus, instruments, constructional materials and general equipment required by the chemical industry and the numerous other branches of industrial activity associated with it.

There will be a section devoted to the work of the various research associations organized to demonstrate the part which science plays in the development of industry and the control of raw products.

The exhibition will appeal to everyone interested in chemical plant, whether as a maker or as a user and will well repay a visit.

Admission will be free and foreign visitors will be particularly welcome. The British Chemical Plant Manufacturers' Association will be pleased to issue invitations to any foreign visitors who make application to the office of the Association at 166 Piccadilly, London, from which advance copies of the catalog and any other information may also be obtained.

SHIPPING AND SHIPBUILDING

MUKDEN TO BUY 50 VESSELS.—The Northeastern Communications Commission, Mukden, has under study a plan to buy 50 vessels of different sizes to meet the present requirements by swelling the shipping appropriation by $10,000,000 from this year, and another plan how to administer financial relief to the Sungari Navigation Office, Harbin.

NEW FREIGHTER *RYOYO MARU*:—The *Ryoyo Maru*, the new 9,100 ton freighter built by the Kawasaki Dockyard for the Toyo Kisen Kaisha, showed very satisfactory results at her trial runs held on January 10 and 12. She developed a maximum speed of 16.117 knots, beating the record of any other freighter of the same type and with the same engines of the same horse power, that has been built in Japan.

The *Ryoyo Maru* is fitted with M. A. N. Diesel engines and Norwegian Contra-Propellers. She will be chartered by the Kawasaki Steamship Company to be placed on its ocean service, and is scheduled to leave on her maiden voyage on January 24.

LAUNCHING OF *SHOHEI MARU*:—The *Shohei Maru*, 9,800-ton class Diesel cargoboat of the Shimatani Kisen Kaisha of Kobe, now being built in the Mitsui yard in Tama, Okayama Prefecture, was launched on January 24.

The equipment will be completed by the end of March, and the ship will then be delivered to the Shimatani Kisen Kaisha.

The new boat is a sister ship to the *Taihei Maru*, 9,240 ton Diesel freighter, recently built at the Tama yard.

The new boat is of the same type as the *Taihei Maru* although its tonnage is somewhat less. She will carry lumber as does the *Taihei Maru* and also wheat, being specially designed to carry grain, in which point the new boat is said to be superior to the *Taihei Maru*.

TELEPHONE, TELEGRAPH AND RADIO

CABLE LANDINGS:—It is learned at the Ministry of Communications that application has been filed with the Ministry by the Great Northern, Eastern Extension and Commercial Pacific Companies for licenses to land their submarine cables in accordance with the regulations governing the restriction of the landing of submarine cables promulgated by the Ministry.

SHANGHAI-PARIS RADIO:—Direct wireless communication between China and France will be instituted in the immediate future, it is learned at the Ministry of Communications. Trial tests for the transmission of messages are now being made between the Chenju International Radio Station and the Paris Radio Station.

It is also stated that installation of apparatus for radio communication with Germany has been completed and service will shortly be available to the public.—*Kuo Min.*

AVIATION

AEROPLANE WORKS; SHANGHAI.—By order of the Ministry of the Navy, the Aeroplane Works at Mamoi (Foochow) will be removed to Shanghai shortly. A temporary workshop on the premises of the Kiangnan Dock will be set up pending construction of a new plant.

FLYING SCHOOLS FOR CHINA:—The Aviation Division of the L. E. Gale Company is soon to open a flying school at Macao. Plans call for a school as complete in its modern equipment, various phases of study, and personnel, as any to be found in Europe or America. If petitions and conditions warrant, it is hoped to establish a similar school or perhaps only a ground school at Shanghai.

GIANT FORD REPORTED SOLD:—It is reported that the large tri-motored Ford aeroplane which has been giving demonstrations in Mukden, Nanking and Shanghai, has been acquired by Vice-Commander-in-Chief Chang Hsueh-liang. It is learnt that the north-esatern leader has purchased the machine for $200,000 and will use if for his trips between Mukden and Peiping in the future.

NATIONAL AVIATION CONFERENCE.—The date for the convocation of the National Aviation Conference at the Capital, which will discuss measures for the development of aviation enterprises and for the strengthening of the National Air Force for the country's defence, has been set for April next. Regulations governing the holding of the Conference as well as the scope of proposals to be submitted have already been drafted. Delegates to the Conference will consist of representatives from the various provinces and experts specially interested.

NANKING-PEIPING AIR MAIL:—Trial flights for the proposed Nanking-Peiping air mail and passenger service to be operated by the China National Aviation Corportaion will be started on March 5. A telegram to this effect dispatched to the Peiping Municipal Government by the Ministry of Communications, requests that every facility be rendered to the planes upon their arrival at Peiping.

It is also learned that the two Junkers planes ordered from Germany by the Euro-Asia Aviation Corporation, have been landed and assembled in Shanghai. The authorities are also expecting to launch trial flights between Nanking and Manchuli next month so that the Nanking-Berlin service may be formally inaugurated in April.—*Kuo Min.*

NATIONAL AVIATION ADMINISTRATION.—It is announced that reorganization and expansion of the Aviation Department of the Chinese Ministry of War will be effected on March 15 in view of the importance of the air force for the country's defence. The Department, which will in future be independent of the Ministry of War, will be under the direct jurisdiction of the National Government Council in time of peace and under the Commander-in-Chief of the Military, Naval and Air Forces in time of war.

It is understood that the Department will in future be known as the National Aviation Administration, consisting of three departments and nine sections instead of the original six sections. The entire National Air Force is to be reorganized so as to centralize control in the hands of the Administration.

PUBLIC WORKS

HIGHWAY CONSTRUCTION, CHINA:—In order to expedite the completion of the Kiangsu portion of the Nanking-Hangchow Inter-Provincial Highway, the work has been divided into sections and bids opened for their construction. Contracts awarded total nearly $450,000 for 141 kilometers of road and call for completion by the end of April this year. Transportation facilities will be loaned from the military authorities in the form of light rails, wagons, etc. and will be immediately available to assist in conveying supplies for the road-builders.—*Kuo Min.*

YINGKOW HARBOR PROJECT:—A big harbor development scheme, necessitating the expenditure of $54,000,000, is being considered by the Manchurian Government and the management of the Peking-Mukden Railway, this being the building of a modern harbor, 31 feet deep at Yingkow facing the Gulf of Liaotung. The promoters of the scheme believe that the completion of a modern harbor at Yingkow will prove to be beneficial to the Peking-Mukden Railway which will then have its own outlet to the sea. The scheme also provides for the construction of three wharves with accommodation for several steamers of over 3,000 tons. A series of godowns will also be constructed.

S.M.R. OSAKA WHARF :—A quay extending 1,110 feet long will shortly be built by the Osaka Municipality at Sakurajima, Osaka harbor, with the Y.2,500,000 that has been donated by the South Manchuria Railway Company to the city. This quay is going to be used by the S.M.R. in its unloading of Fushun coal in Osaka.

Side by side with the construction of this quay, the city will dredge the surrounding sea to a uniform depth of 30 feet and reclaim 16,000 tsubo or slightly more than 13 acres of land in the neighborhood as its own investment. The projected reclaimed land is going to be rented by the S.M.R. for its coal yard.

S.M.R. PLANS NEW KAWASAKI WHARVES :—The South Manchuria Railway Company is going to construct two new piers and to effect a general improvement of equipments in Kawasaki port for the purpose of facilitating the transport of the products from Manchuria and Mongolia to Tokyo and its neighborhood.

The construction work will be taken in hand shortly. The present scheme is said to comprise a plan of reclaiming land in the port to the aggregate area of 65,000 tsubo.

One of the proposed wharves will be 156 meters long and 10 meters wide, and the other pier 294 meters long and seven meters wide.

TRACKLESS TRAMS EXTENSION, SHANGHAI :—The International Settlement Authorities will shortly take up the matter of smaller trackless trollies for the narrower streets with the Shanghai Electric Construction Company.

The suggestion was made with a view to relieving the congested traffic now obtaining in the main streets in the city, with the operation of more trackless tram-cars it is hoped that part of the traffic will be diverted to those streets on which no trollies are being operated at present. The Public Works Department of the Shanghai Municipal Council will also discuss with both the electric company and the China Omnibus Company details concerning placing more tram-cars and trollies on the various lines as a relief to the usual crowded street cars and buses.

MUKDEN WATERWORKS :—The long-pending question of constructing waterworks for the Chinese city of Mukden has been approved by the Board of Construction of Liaoning Government. Work will be commenced in April next.

VLADIVOSTOK HARBOR: The Habarovsk Government is to lay a branch line between Vladivostok and Possiet Bay to develop the Ussuri Line, and will reconstruct Vladivostok harbor on the five years' plan.

In order to make Nikolisk-Ussurisk an industrial center, a scheme to build an extensive oil mill has been drafted, and G.R.1,500,000 is to be laid out in 1932, planning to put out G.Y. 2,500,000 worth products in the course of 11 years. Ultimately the production is to be increased to G.Y.5,000,000.

All the bean oil put out is to meet the domestic wants in Soviet Russia.

S.M.R. Co. COAL JETTY, TSURUMI :—The S.M.R. has awarded to Okura and Co. the contract for the construction of a new coal jetty at Tsurumi near Yokohama, to cost Yen 1,200,000. Tenders were invited for the construction of a jetty capable of berthing two colliers, each of 8,000 ton class, and another for a merchant vessel, together with the construction of the bunding walls and the dredging work.

The contractors, expect to complete the job by the end of 1932.

BRUNNER, MOND PLANS TO BUILD FACTORY IN CHINA :—Brunner, Mond and Company is planning to establish a factory in China in order to dominate the market of dyestuffs and drugs here, according to a Tientsin report received by the Industry Department of Osaka Municipal Office.

The Company recently dispatched several experts to China. These are now investigating the prospects for sales of soda ash and sulphate of soda.

It is understood that after the investigation, the Company may buy the Yungli Salt Company, a joint corporation controlled by Brunner, Mond and Company and Chinese capital. Its scope will then probably be extended.

BANGKOK'S WATER SYSTEM :—Nai C. Kim Hah has been awarded the contract for laying the pipes for the extension of the distribution system of the Bangkok Waterworks, at an approximate amount of Tcs. 120,000.

KANCHINGTZU COAL PIER EXTENSION: —The new coal pier at Kanchingtzu, across the Bay opposite Dairen, having finished its second stage construction work, consisting in the extension of the pier by 125 meters, was opened to service from the 1st ult.

Heretofore, only two steamers could be berthed at the new coal pier for loading coal, but now four steamers can be served at a time.

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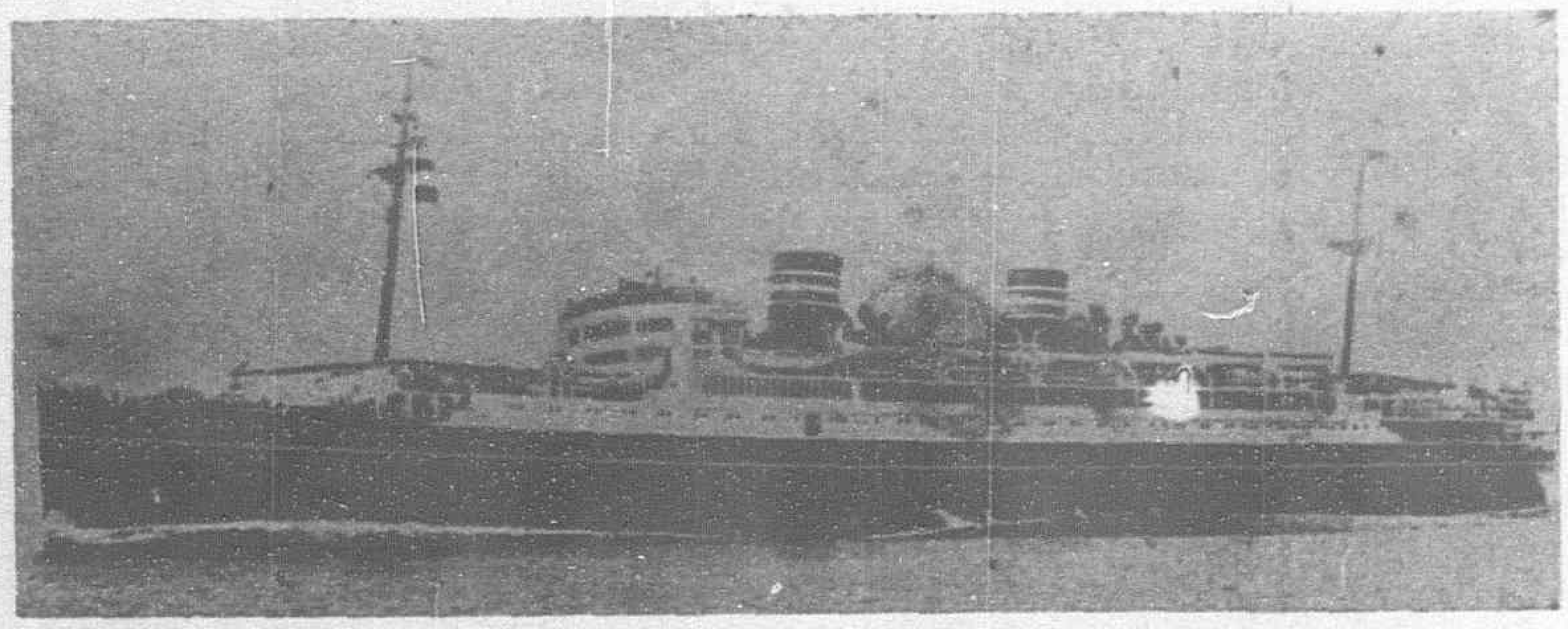

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